News of the Industry Begins Page 852

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AUTOMOTIVE INDUSTRIES
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Sales Found *to* Grow *as Wholesale Outlets* are Increased

Manufacturers of replacement parts, accessories, small tools and shop equipment report rise in business volume as new distribution points are added.

By Leon F. Banigan
Editor, Motor World Wholesale

TWO pertinent questions have been asked by many sales executives in the manufacturing and wholesale fields since pyramiding car registrations and intensive competition have substantially increased the wholesale outlets of many manufacturers in the replacement parts, accessory, shop equipment and small tool fields:

1. Does multiplication of wholesale outlets produce a corresponding dollar volume of business?

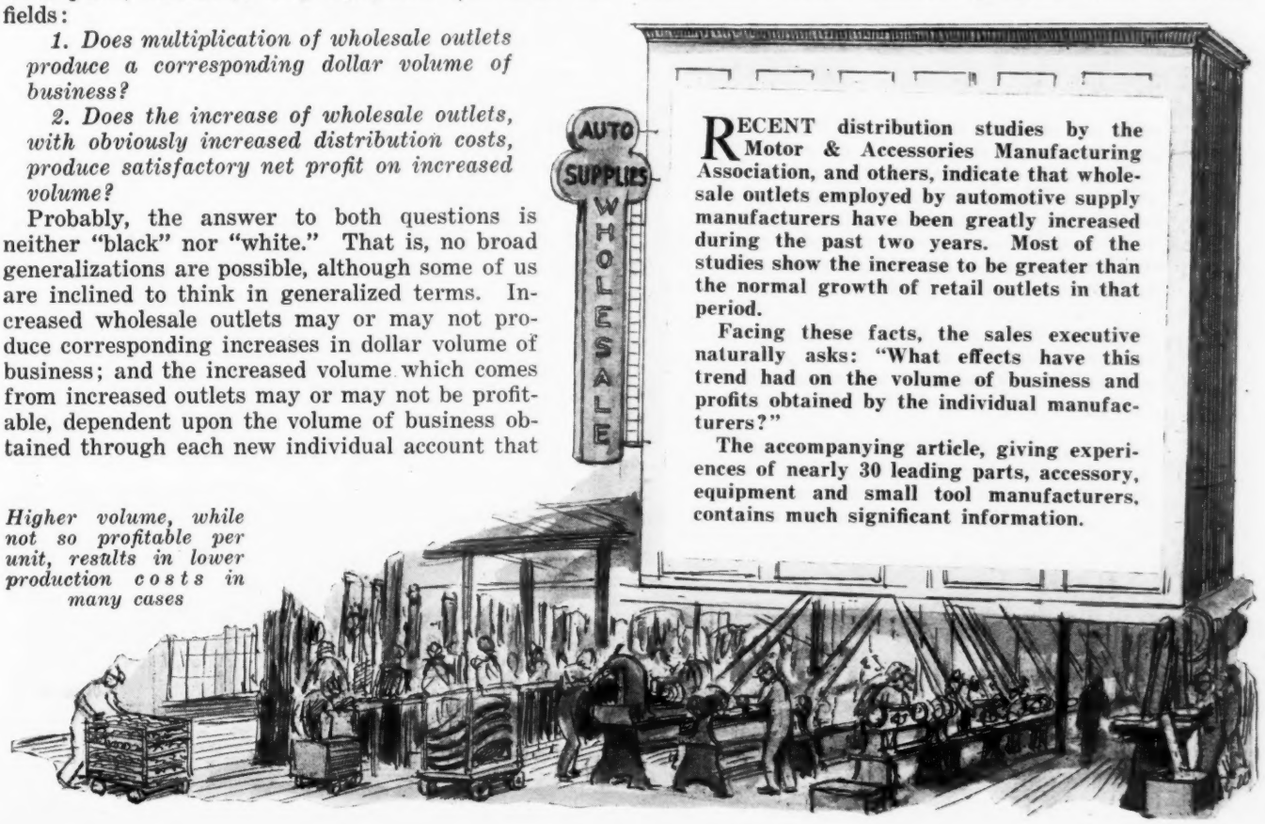
2. Does the increase of wholesale outlets, with obviously increased distribution costs, produce satisfactory net profit on increased volume?

Probably, the answer to both questions is neither "black" nor "white." That is, no broad generalizations are possible, although some of us are inclined to think in generalized terms. Increased wholesale outlets may or may not produce corresponding increases in dollar volume of business; and the increased volume which comes from increased outlets may or may not be profitable, dependent upon the volume of business obtained through each new individual account that is added and the cost of serving each individual account. The mistake most frequently made is to apply generalized deductions based on insufficent information. Distribution policies often lean too far in one direction or the other and thus nullify the advantages that might accrue if a better balanced program were followed.

RECENT distribution studies by the Motor & Accessories Manufacturing Association, and others, indicate that wholesale outlets employed by automotive supply manufacturers have been greatly increased during the past two years. Most of the studies show the increase to be greater than the normal growth of retail outlets in that period.

Facing these facts, the sales executive naturally asks: "What effects have this trend had on the volume of business and profits obtained by the individual manufacturers?"

The accompanying article, giving experiences of nearly 30 leading parts, accessory, equipment and small tool manufacturers, contains much significant information.



Higher volume, while not so profitable per unit, results in lower production costs in many cases

In view of present marketing conditions and trends, this much at least has been said in favor of reasonably controlled increase in wholesale outlets by the average automotive supply manufacturer: "The volume obtained, while not so profitable per unit, is making it possible for many manufacturers to lower production costs—often a paramount necessity for obtaining or maintaining a place in the field. While the extent to which distribution may be increased profitably must be determined by the individual manufacturer upon factors often peculiar to his own particular business, the following experiences of others in increasing distribution outlets are interesting.

Motor World Wholesale recently asked more than 300 well-established automotive supply manufacturers with national distribution for their experiences with increased distribution outlets during the past three years. We found little uniformity in the replies, in either results or in sentiment. Seventy-one per cent of the manufacturers who made returns reported that they had enlarged their wholesale coverage during the past year both as to the number of cities and number of wholesalers used.

Twenty-seven replies (a little less than 10 per cent) permitted of tabulation as to:

(a) Percentage of increase in cities used as wholesale distribution centers in the past three years.

(b) Percentage of increase in total number of wholesale accounts for the same period.

(c) Percentage of increase in unit volume of sales in the same period.

(d) Percentage of increase in dollar volume of sales for that period.

The results were as follows: Two manufacturers of shop equipment who increased their number of outlets up to 5 per cent (one of them 2 per cent and the other 5 per cent) showed an increase of 7 per cent in both unit and dollar volume of business.

Four manufacturers, two shop equipment and two accessories, who increased the number of wholesale outlets 6 to 14 per cent, showed an increase in unit volume of business of 20 per cent and an increase in dollar volume of business of 33 1/3 per cent.

Five manufacturers, including two replacement parts, one shop equipment and two small tools, who increased their wholesale outlets 15 per cent, obtained a 22 per cent increase in unit volume and an 18 per cent increase in dollar volume.

60% Increase in Unit Volume

Four manufacturers of replacement parts, who increased wholesale outlets 16 to 20 per cent, showed 35 per cent increase in unit volume and 36 per cent increase in dollar volume.

Four manufacturers, two shop equipment, and two tools, who increased their wholesale outlets 21 to 30 per cent, showed 60 per cent increase in unit volume and 59 per cent increase in sales volume.

Three manufacturers, one replacement parts, one equipment and one accessory, who increased wholesale outlets 31 to 40 per cent, showed 24 per cent increase in unit volume and 16 per cent increase in dollar volume.

Two manufacturers, one replacement parts and one equipment, who increased wholesale outlets 41 to 50 per cent, showed 80 per cent increase in unit sales and 71 per cent increase in dollar volume.

Three manufacturers, one small tool, one replacement parts and the other shop equipment, who increased wholesale outlets 100 per cent or more, showed 138 per cent increase in unit volume of sales, and 104 per cent increase in dollar volume.

Relation Between Volume and Increase in Wholesale Outlets

	Manufacturer	Percentage increase in number of cities	Percentage increase in wholesale accts	Percentage increase in unit volume	Percentage increase in dollar volume	Average percent increase in wholesale accounts	Average percent increase in unit volume	Average percent increase in dollar volume
1	Equipment	..	2	10	10	Up to 5	7	7
2	Equipment	..	5	..	5			
3	Accessories	..	10	10	12	6-14	20	33
4	Rep. Parts	5	10	30	25			
5	Rep. Parts	6-10	10	..	62			
6	Accessories	1	12	20	..			
7	Tools	10	15	Decrease	10	15	22	18
8	Rep. Parts	15	15	45	40			
9	Rep. Parts	10	15	25	28			
10	Equipment	..	15	20	Same			
11	Tools	15	15	20	12			
12	Rep. Parts	15	..	60	72	16-20	35	36
13	Rep. Parts	..	19.3	31.3	20.6			
14	Rep. Parts	15	20	25	25			
15	Rep. Parts	12-15	20	25	25			
16	Equipment	15	25	..	50	21-30	60	59
17	Tools	22	26	..	32			
18	Equipment	15	29	132	125			
19	Tools	25	30	25	30			
20	Rep. Parts	23	33	17	14	31-40	24	16
21	Equipment	33	33	5	5			
22	Accessories	33 1/3	33 1/3	50	30			
23	Rep. Parts	40	44	48	41	41-50	87	71
24	Equipment	25	50	125	100			
25	Tools	50	100	25	25	100 and over	138	104
26	Equipment	..	100	313	233			
27	Rep. Parts	242	242	75	55			

Variations between increases in unit volume and price are largely due to price or model changes in some units of the various lines during the three years. Addition of new items to the line affected favorably, in most instances, and unfavorably in a few, the increase in unit volume and dollar volume as compared with number of outlets used. While the number of manufacturers considered is probably not as large as might be desired in such a study, this sampling does represent about 10 per cent of the 300

better and larger manufacturers in the field.

An interesting development of this study was the corresponding increases in unit and dollar volume of sales that accompanied increases in the number of outlets used. In only one group, the three manufacturers who increased wholesale outlets 31 to 40 per cent, was there an increase in the sales volume of less percentage than the increase in wholesale outlets. The returns in this instance do not indicate the reason for this. The variation is due, probably, to the peculiar conditions existing in the small number of manufacturers who appear in this group. But, eliminating the dip in the sales increase curve of these three manufacturers, there is a smooth upward trend from 7 per cent to 138 per cent in the unit volume of sales and from 7 per cent to 104 per cent in dollar volume.

All of the companies participating in this study have well-established distribution among the better class of general and replacement parts wholesalers and no individual return indicates that the increased volume of the past three years was obtained at a loss. In fact, the statements of the companies available will probably average a slight increase in net profits for that period.

In the case of one manufacturer of shop equipment who showed more than 100 per cent increase—actually 233 per cent increase in dollar volume—1925 was the first full year on the automotive line reported. In the case of the replacement manufacturer, in the group which averaged more than 100 per cent increase in distribution outlets, the percentage of sales increase was 75 in unit volume and 55 in dollar volume. This manufacturer had 73 wholesale outlets on January 1, 1925, and 250 wholesale outlets on January 1, 1928.

By and large, the increase in number of cities used was quite comparable with the increase in wholesale outlets, indicating particularly in the case of shop equipment and accessory manufacturers that the increases in wholesale outlets represented accounts added in new distribution cities.

In the case of replacement parts manufacturers, the increase in wholesale outlets was generally larger than the increase in the number of cities used, indicating the establishment of more wholesale outlets in cities where they previously had representation.

One manufacturer of small tools increased the number of cities 50 per cent and the number of wholesalers 100 per cent, while the increase in unit and dollar volume was only 25 per cent. His reason for this was: "Our tool sales are bulked. We do not keep separate accounts by lines. Some lines have not been pushed during the last three years for the reason that there is no money in them. Sales in these lines, therefore, have diminished, but the loss of sales in the lines referred to have been made up and the total volume increased approximately 25 per cent by the lines that we are now pushing."

Four-Unit Oil-Electric Train Built in England

A NEW oil-electric train of four units, powered by a 500-hp. Beardmore Diesel engine and built by Wm. Beardmore & Co., Ltd., in conjunction with the English Electric Company, Ltd., is described in *The Engineer*. The engine is an eight-cylinder design with cylinders of 8¼ in. bore and 12 in. stroke and develops its rated power at 900 r.p.m. By the extensive use of alloy steel its weight has been brought down to 14.5 lb. per brake horsepower. In general the engine is of the same type as built by the Beardmore company in four-cylinder form for the Canadian National Railways some years ago and which was described in these columns at the time.

The train has a total weight, unloaded, of 144 tons and can accommodate 32 first-class and 255 third-class passengers. The oil engine-generator set is arranged in the forward part of the first coach, ahead of the baggage compartment, the engine space being 22 ft. long.

The engine is automatically controlled by electrical means. Four solenoids operated from the controller control differential piston valves in an oil circuit, and by varying the oil pressure the governor is set in one or the other of four different running positions. The engine is thus able to idle at 350 r.p.m. and to run at either 600 or 750 r.p.m. or at the maximum designed speed of 900 r.p.m., and at each setting the governor maintains a constant speed.

Monitor valves are included in both the cooling water circuit and the lubricating oil circuit, and in case of failure in either of these systems a pilot light in the driver's compartment is lit up. Arrangements are made whereby the engine can be shut down from the driver's compartments at both ends of the train, by energizing a trip solenoid which releases a shutter in the main air inlet, cutting off the supply of air.

The generator has a maximum designed output of 340 kw., at 900 r.p.m., on a one-hour rating. It is of the single bearing type and the exciter is overhung at the commutator end. The shunt winding of the generator is energized by the exciter or the battery, according to the speed of the engine, and a differential compound winding is also provided, which gives the unit a practically constant output characteristic independent of motor speed. An adjustable resistance for the shunt field coil is provided but is not used by the driver, being set in the sheds to adjust the engine and generator output.

At engine speeds higher than 600 r.p.m. the exciter functions as an auxiliary generator. It supplies constant voltage current for battery charging and for auxiliary loads, such as lighting, control operation and driving the brake exhausters, if necessary.

The battery charging current is at a maximum at the 900 r.p.m. engine speed, and it diminishes with the speed until 600 r.p.m., when the battery floats across the exciter The normal designed output of the exciter is 7.75 kw. at 120 volts, the voltage at maximum engine speed being 147, corresponding to the voltage of the battery when fully charged.

The two motors are mounted on the bogie at the trailing end of the power coach. Each motor is rated at 280 hp. on the one-hour rating at 580 volts, and drives with a gear ratio of 18 to 60. They are connected to the generator in permanent parallel through a remote control circuit breaker. There are field tap connections for weakening the field in two steps, and a remote controlled reverser which can be operated from either driving position determines the direction of the train. The main control gear is mounted on a framework over the main generator.

The engine is started by operating the generator as a motor with battery current. After the battery switch is closed and current for general purposes is obtained, the generator field switch is also closed and then the starting switch.

Free Servicing a Severe Burden on Machine Tool *Industry*

Complaints are growing that custom of expecting manufacturer to service his product indefinitely without cost is unfair. Automobile warranty ends in 90 days.

By K. W. Stillman

THE telephone rings in the Detroit office of the Superior Grinding Machine Co.

"Hello. This is the Acme Motor Co. Say, send a service man over here right away. One of your grinders has gone 'haywire' and is holding up a production line."

"I'm sorry, but all of our service men are out on jobs now. Supposing I have one drop in the very first thing tomorrow morning."

"Nothing doing. I tell you your darn machine is holding up our line. We have got to pass 200 more pieces through it today and that means it has got to be fixed in a little less than no time if possible. You get a man out here just as quick as you can."

After a bit of telephoning a service man was located and was sent post-haste to the Acme plant, where he quickly got in touch with the man who had made the complaint.

The service man needed but one look at the parts they were still trying to put through the grinder to realize that something was very much wrong. The part required a very fine finish and was supposed to be held within half-thousandths tolerance, but those being ground looked as if they had been filed by a drunken man working in the dark.

Yes, there was no doubt that something had gone haywire, as the production man claimed.

Just then the service man noticed something else.

"That's a new grinding wheel you have on there, isn't it?"

"Yes, we just put it on a couple of hours ago."

"Was the grinder working all right before that?"

"Why, yes, it seemed to be working all right. It started going bad right after we changed the wheels."

"Well, that sort of looks as if you might have put the wheel on wrong."

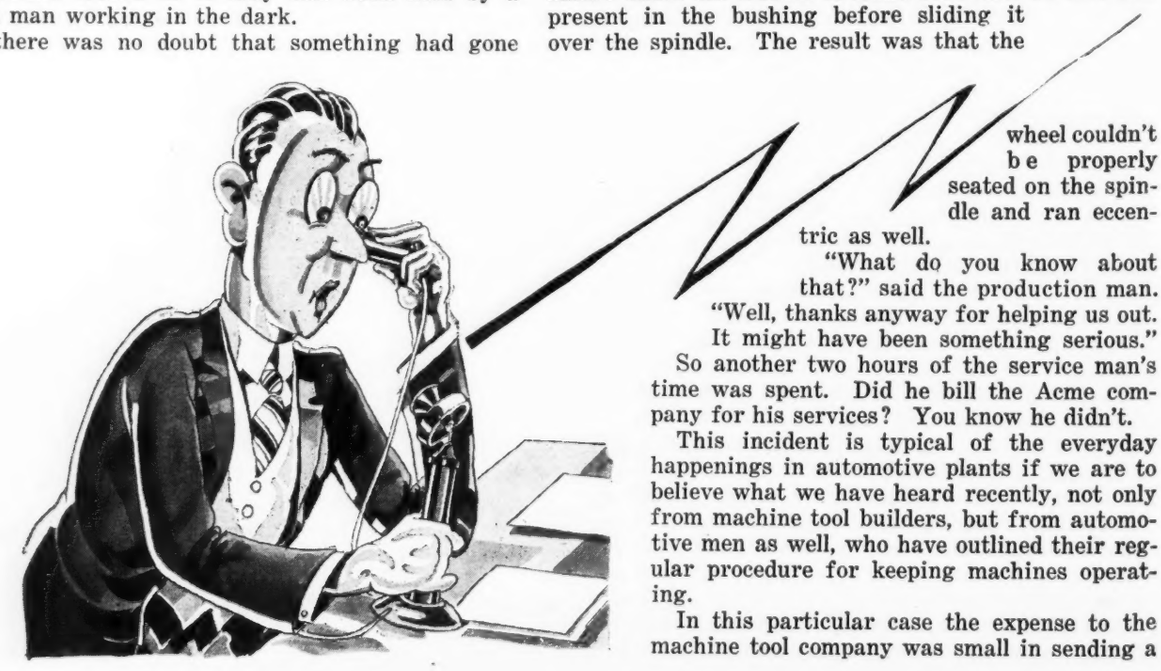
"Not a chance. That wheel was put on just the same as we put on all of them. Your darn machine has passed out, that's what's the matter."

Dirt in the Subhead

"You may be right, but suppose we take the wheel off anyway just to see."

So the machine was stopped and the wheel removed. Immediately the service man took it, passed his hand inside the bushing and found—what he had more than half expected—several particles of grit already partially imbedded in the bushing.

The workman had put the wheel on all right but he hadn't taken the trouble to make sure that no dirt was present in the bushing before sliding it over the spindle. The result was that the wheel couldn't be properly seated on the spindle and ran eccentric as well.



"What do you know about that?" said the production man. "Well, thanks anyway for helping us out. It might have been something serious."

So another two hours of the service man's time was spent. Did he bill the Acme company for his services? You know he didn't.

This incident is typical of the everyday happenings in automotive plants if we are to believe what we have heard recently, not only from machine tool builders, but from automotive men as well, who have outlined their regular procedure for keeping machines operating.

In this particular case the expense to the machine tool company was small in sending a

service man, but we are led to believe that if the nearest service man had been located 200 miles away the Acme company would have been just as insistent upon getting him on the same free service basis.

Just how this attitude toward servicing of machine tools has been allowed to gain the prestige of a custom is uncertain, but, according to machine tool builders, it is one of the most important items involved in making many of them realize the full meaning of the term "profitless prosperity."

This responsibility for service during the life of a machine tool, without cost to the user of the tool regardless of whether the servicing is made necessary by a fault of the machine or by carelessness of the operator, is not confined to the automotive industry by any means, but, we are reliably informed, the automotive industry is, in general, more insistent in service demands than any other.

"Say, send a service man over here right away. One of your grinders has gone 'haywire' and is holding up a production line. Get a man out here just as quick as you can"

Instead of this condition it might have been expected that the automotive industry, in particular, would appreciate the difficulties involved because of its experiences in servicing its own products. Automobiles are sold on a 90-day warranty, at the end of which period all servicing is supposed to be paid for by the car owner.

That strict adherence to this policy has been exceedingly difficult is well known. Manufacturers have pointed out to their dealers that they should get full remuneration for all servicing done outside the terms of the warranty, but when a satisfied customer is in the balance it has been impossible to prevent the practice of giving free service to some extent from being continued.

This is the same sort of problem which confronts the machine tool builders. They are now going through the troublous times that the automotive industry did in its early days and it may be expected that eventually they will arrive at a solution, or remedy, at least, similar to that which was developed by the automotive industry.

Although some dealers fail to carry out their instructions it is generally true that free servicing of automobiles ends after the 90-day period. During this time only parts which fail in service will be replaced free of charge. Even then, however, the owner of the car must usually pay for the cost of installing the replacement part.

Compare this with the demand of an automotive concern for the replacement of a spindle from a machine tool which had been in operation for over three years. The spindle was returned to the maker for gratis replacement. When it was received it was found to be checked and blued with heat—convincing evidence that it had failed because the machine had been run dry for a considerable length of time. In spite of this, the owner of the machine was very much dissatisfied that he was obliged to pay full price for a new spindle and for its installation.

The service problem has grown in importance as the complexity of machine tools has grown. In the transference of skill from the operator to the tool it is impossible to avoid more or less complicated mechanisms which are much more difficult to maintain in proper condition than the simple machines of the nineteenth century.

Responsibility is Greater

There are few machine tool builders, apparently, who do not realize that their responsibility for machine tool operation extends much further today than it did a few years ago. While it is no hardship for most organizations to provide a maintenance personnel fitted to service simple lathes, drill presses and similar equipment, few companies, even in the automotive industry, can profitably have men expert in the repair and maintenance of all the highly specialized equipment in their plants today.

When anything happens to such equipment it is almost essential that a service man from the factory which made it be summoned in order that it may be placed in operating condition again in the shortest time and with the least expense. The machine tool builders recognize this condition and are usually prepared to render service of this nature whenever it is needed.

The heavy burden, however, is that of being held responsible for breakdowns which are obviously the fault of operation and not of the machine. They expect, for example, that the machine will be installed properly on a level and firm foundation; that the proper tools will be used with it and the proper feeds and speeds employed for the particular work being done; that the machine will be lubricated and that, in general, it will be given the ordinary attention and care that one would expect to be given to an expensive and valuable piece of production equipment.

Unfortunately, it would appear, a fair proportion of the service complaints now received are found, upon investigation, to be caused by lack of attention to one of these or similar items. Sometimes, of course, the

machine is at fault. It may not be suited for the work, or the design may be incorrect in some detail. Frequently, however, the complaint can be traced back to a condition brought about by improper operation.

The results of this servicing habit with which the machine tool industry is afflicted are widespread. In the first place it is axiomatic that the service costs money which someone must provide. Since the user of the service will not pay for it as he gets it, as has been the case up to the present, the machine tool builder must estimate the probable cost of servicing each machine or series of machines and include this cost in his selling price. Otherwise, much, if not all of his profits will vanish, he will disappear from the field and industry in general will lose the benefit of his possible future contributions.

Hardship on Efficient Plants

For the inefficient plants operating machine tools this method of loading service costs on selling costs may be satisfactory, but it certainly is not for an efficient plant such as most in the automotive industry are. A well organized and supervised production department will want to make relatively few calls upon machine tool builders for service. Machine tools of today are well built. With proper care they will operate satisfactorily and they will receive proper care in well-managed plants.

But, under the present conditions, these well-managed plants are having to pay more for their machine tool equipment in order to subsidize the maintenance work carried on by the machine builder in the plants of poorly managed companies.

This is scarcely a satisfactory condition, particularly since automotive concerns are thereby helping keep afloat concerns in other industries which are part of the new competition fighting the automotive industry for a larger share of the consumer's dollar.

From the tool builders' viewpoint the whole problem is rather ticklish. It so happens that, in the automotive industry particularly, the men in the organization who are most influential in selecting new equipment are also more or less responsible for the successful operation of that equipment.

Thus, when a foreman or other production man complains to the methods, or tool design, or equipment, or similar department which selected the tool, that it is not working satisfactorily, this department is very likely to pass the buck on to the tool builder. The latter, of course, is anxious to do anything within reason to please the men in the methods department since they were instrumental in selecting the equipment, so, under these circumstances, it may not be unusual that the tool builders frequently go to much greater lengths in servicing automotive machines than they reasonably should.

The situation has become so acute within recent months, however, that a number of machine tool builders are giving thought to developing some method for coping with it. A few of them at least are considering the advisability of a service plan patterned to some extent after that employed by the automotive industry in servicing motor vehicles.

It has been suggested that free service for machine tools be provided for a definite period after the sale. This period would be longer, probably, than the 90-day warranty of the automotive industry, to make sure that the machine is set up properly and its operation understood. At the end of the period all servicing would be charged, probably on a flat-rate basis. Some provision might be made to care for the relatively few cases when failure occurs after the free servicing period but which is obviously the fault of the machine.

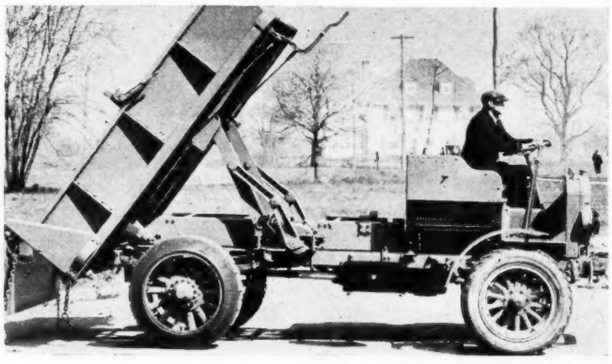
If some such plan as this should be adopted by a few machine tool builders it is unlikely to be adhered to by all. Competition is severe and there are many executives who believe, rightly or wrongly, that there are many times when business at no profit, or even at a loss, is better than no business at all. So long as this idea prevails to any extent concessions in service and other things will continue to be given in return for orders.

If a number of the larger and more stable machine tool builders should adopt some such servicing policy, however, it should alleviate conditions greatly. There are likely to be protests from machine tool users if and when such a plan is utilized. Its benefits, in the long run, should become visible to all after a little experience with it and then, possibly, like many things which are forced upon us for our own good, it may be wondered how the industry ever got along under other conditions.

Autocar Dump Hoist

THE AUTOCAR CO., Ardmore, Pa., has perfected a new rotary dump hoist mechanism which will raise the body to an angle of 60 deg., as compared with the 40-deg. angle which was formerly the maximum.

An important feature of the new mechanism is the automatic cut-out which cuts off application of the power as soon as the body reaches the maximum elevation and similarly cuts off the power when the body has returned to full normal position. This requires no attention from the driver of the truck and he may put the truck in motion before the body has returned to normal.



Autocar rotary hoist with 60-deg. dumping angle

The 60-deg. dumping angle will greatly increase the ease with which a wet-batch may be dumped and it was chiefly for the highway and construction trade that the new mechanism was designed.

IN order to demonstrate the applications of nitrided steel (steel case-hardened at comparatively low temperature without distortion by the use of ammonia gas), a laboratory for experiments is to be installed at the Grand Palais, Paris, during the eleventh aircraft show, and it is expected that spectators will be much interested in the demonstrations to be made.

Just Among Ourselves

July Will be Month of New Car Announcements

EVERY month is new-model month in the automobile industry these days. Gone are the times when a majority of announcements were made on one or two given dates each year. January and August probably still are the leading announcement months, but the prospects are that July will be in the running pretty strongly this year. At least 10 new models are to be expected before the end of September, with six of them possible in July. The exact dates of announcements, of course, depend on the combination of so many factors that accurate advance predictions are pretty difficult. Final completion of the design, reasonable readiness for quantity production and the reasonable exhaustion of cars on dealers' floors are three matters, for instance, each of which may advance or retard the actual announcement date by several weeks.

* * *

Selecting Right Men to Attend Conventions

WITH the coming of June, the summer convention era is with us again. Automotive technical and marketing problems will vie with golf scores for the attention of automotive men at Mackinac Island, Quebec, Atlantic City and other important convention centers. In the minds of those paying the bills will arise the old question as to whether or not dollar-for-dollar value is obtained from various conventions and gatherings, while new attendance records will continue to be established meanwhile. Personally we believe in conventions—for some people. Fundamentally, the idea of such gatherings is thoroughly sound; they constitute an important link in the building of automotive progress. But there is no denying the fact that from the standpoint of the companies paying the bills, certain types of men make far better convention attenders than others.

* * *

Must Keep Mind Open to New Ideas

WE don't agree with the conception of the hand-shaking go-getter as the ideal company representative at a convention. Qualities of sociability are highly desirable without question, but these alone don't amount to much in the long run, except as good-will builders, so far as the company paying the bills is concerned. The important thing, as we see it, is to have a man with that positive, flexible type of mind which reaches out for new ideas, works them through the mill of his brain and molds them to a form adaptable to his own particular everyday business problems. The man with a negative approach to ideas which impinge on his consciousness usually is wasting his own time and his company's money at a convention. He sits back and continually proves to himself that all of the ideas which are expounded do not fit his particular conditions. He expects the speakers or the men with whom he contacts casually during the meeting to visualize everything for him in terms of his own particular problems; he wants a formula to be handed to him; he subconsciously resents the insinuations that he must do active, vital mental work himself on the ideas which are floating about if he is to get anything at all out of the meeting.

* * *

Might as Well Stay at Home

THIS latter type of convention attender can be heard on the home-coming trip saying: "Well, after all, what was there said up here that I didn't know? I could have read all that." Probably he could have read it; and having approached the meeting and its possibilities for informal as well as formal mental contacts in a defensive, negative mood, he might as well have stayed home and read it. By failing to function actively in a mental way throughout the convention he missed all those opportunities for argument, discussion and immediate interplay of thought which is possible only through personal contact. Conventions *give* very little of a dollars and cents value as a general rule; they usually do provide a chance to *get* a very great deal. The responsibility for profiting from them lies on the individual attending the convention. Elimination of waste in conventions can be achieved to a large extent by selection of men to attend who will make them opportunities for m e n t a l stimulation and activity; a meeting of functioning minds as well as of convivial spirits and of passive, dormant brains. The first two are not mutually exclusive by any means; but the first and the last don't mix well.—N. G. S.

Automotive Industries
June 2, 1928

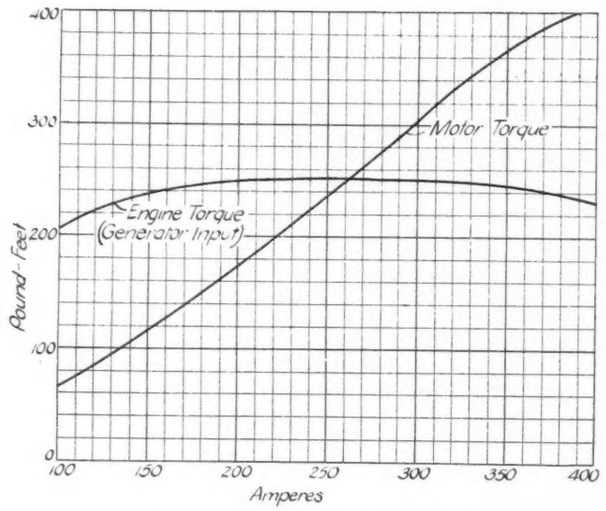


Fig. 1—Change of generator input torque and of motor torque with change in armature current

Features of

Gas-Elec

Present system in use for buses to solve problem of power longer stored, but is

By P. M.

THE present system of electric drive for motor buses is the result of a long-continued series of efforts to solve the problem of power transmission on gasoline-engine-propelled vehicles electrically.

In most of the earlier systems a comparatively large storage battery was used, which could absorb the whole of the generator output when the vehicle was coasting and which in some cases served also to start the vehicle and the engine simultaneously. It was soon recognized, however, that such a large battery, although it added to the convenience of use of the vehicle, made it unduly heavy and expensive. In most of the systems on which work has been done during the past decade power is generated at the same rate at which it is being used in the propulsion of the vehicle, and no attempt is made to store energy during periods of light running and draw upon the store at other periods.

With a direct mechanical drive, if the resistance to motion of the vehicle increases, the rear axle torque and the engine torque increase in the same proportion, as long as the gears are not shifted. With electric drive also a change in traction resistance is accompanied by a proportional change in rear axle torque and in the flow of current through the motor. If the motor draws increased current the generator, of course, has to supply it, and if everything else remained the same the torque required to drive the generator would increase in direst proportion to the current delivered by the generator.

Automatic Torque Converter

The torque, however, depends also upon the strength of the magnetic field, which latter increases with the armature current in the case of the motor and decreases as the armature current increases in the case of the generator. Field strengths vary automatically with change in armature current and the electric transmission therefore constitutes an automatic torque converter.

Papers on electric drive for motor buses have been presented to several engineering societies during the past year and in preparing this article the writer has drawn particularly on a paper read before the Pennsylvania Section of the S.A.E. by C. A. Atwell, of the Westinghouse Electric & Mfg. Co., and a paper presented before the American Institute of Electrical Engineers by Charles Froesch, formerly of the International Motor Co.

One operating factor that is common to both generator and motor is the armature current. Except for the small amount of current taken by the generator shunt field and that required to keep the vehicle battery charged, the current entering the motor is the same as that collected from the generator armature, and motor current and generator current increase and decrease together. With constant field strength the armature torque is proportional to the current flow, and armature current is generally considered a measure of armature torque.

Field Strength Not Constant

However, the field strength is not constant in either the generator or the motor. The motor has a series field winding; if the armature current increases, the current through the field coils increases equally, and for this reason the motor torque increases faster than the armature current. Of course, after the field has reached the saturation point any increase in field current does not strengthen the magnetic field appreciably, and the proportion between increase in motor torque and increase in motor current is therefore par-

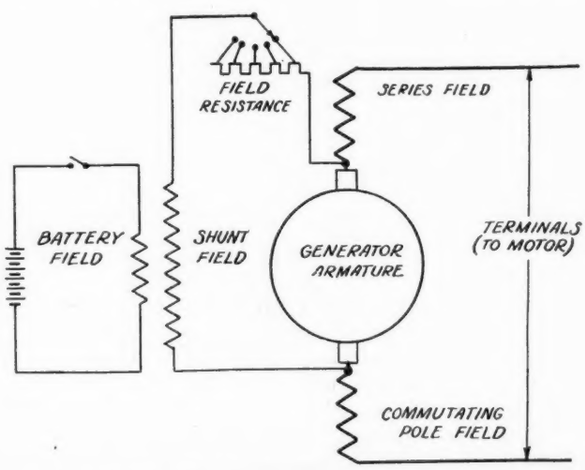


Fig. 3—Diagram of generator connections (Westinghouse)

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is result of long series of efforts
transmission. Energy no
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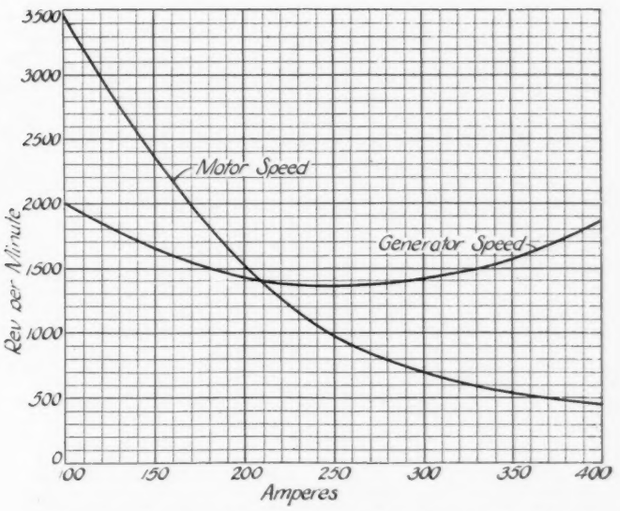


Fig. 2—Change of generator and motor speed with armature current

ticularly great at small armature currents. A curve showing the variation of motor torque with current flow is always convex toward the current axis.

The exact opposite holds with respect to the generator. Field excitation of the generator is derived principally from a shunt winding connected across the generator mains. When the current drawn from the generator increases, as by a pulling down in motor speed due to an increase in traction resistance, there will be an increase in potential drop within the armature windings, and consequently a decrease in terminal voltage and a decrease in field excitation due to the shunt coils. Hence, even if the generator speed remained absolutely constant, the field strength would decrease with an increase in armature current. However, with the increased torque load on the engine due to the greater armature current, the engine will drop in speed, which will result in a further decrease in terminal voltage and in shunt field strength.

There is still another effect tending to produce the same final result; namely, the armature reaction. Any current flowing through the armature coils sets up a cross magnetizing effect which when combined with the magnetic effect due to the field coils results in a shifting of the magnetic flux through the armature core. Then, if the brushes are set for small current flow, they will no longer be in the correct position for maximum voltage and the result is that the voltage at the armature terminals for a given armature speed is reduced. The effect is generally briefly described by saying that armature reaction reduces the induced voltage.

Engine Load Remains Constant

Thus there is an inherent tendency for the field strength of the generator to decrease with an increase in armature current. The horsepower output of the generator is proportional to the product of the voltage and the current, and if the generator voltage drops while the current increases there is a tendency for the engine load to remain constant irrespective of the rear axle torque (and motor torque). If this tendency is not sufficiently pronounced it can be strengthened by providing the machine with a small reverse series winding which tends to demagnetize the field.

This automatic change of torque multiplication by the electric system is well illustrated in Fig. 1, which represents torque curves of generator input (engine torque) and of the electric motor. Actually the torque curve represents the combined torques of two motors used together with a single generator. It will be noticed that with a current flow of 120 amp. the generator torque is about 222 lb.-ft. and that there is only little variation in the generator input torque from this point on. On the other hand, the motor torque, which is 74 lb.-ft. with a current flow of 120 amp., reaches 412 lb.-ft. for a current flow of 400 amp. If we consider 74 lb.-ft. the minimum motor torque with which the vehicle can be moved the range of torque variation in this case is

$$\frac{412}{230} \times \frac{222}{74} = 5.38$$

How the speed of the generator and motor vary with the armature current is shown in Fig. 2.

Separate Excitation

When it was first attempted to connect a vehicle motor directly to a generator driven by an internal combustion engine without having a battery floating on the line, one difficulty that was experienced was that when the driver opened the throttle quickly for a rapid getaway, the engine would be momentarily without adequate load and would "race" which would not only be injurious to its mechanism but result in unpleasant vibration. The reason for this was that the generator had to build up its field from its small amount of permanent magnetism. Picking up of the generator under such conditions is a very much slower process than the acceleration of the engine by opening the throttle wide. The permanent magnetism in the fields of automobile generators is likely to be particularly small, for the reason that magnetic materials of very high permeability have to be used, in order to reduce the weight to a minimum. This calls for specially soft iron or steel, which has a very low magnetic retentivity.

This difficulty was overcome by providing a certain amount of permanent or separate excitation, the current for which, of course, must come from a battery. In one case, in order to save on battery current, a small exciting generator was provided whose field was excited with battery current while the cur-

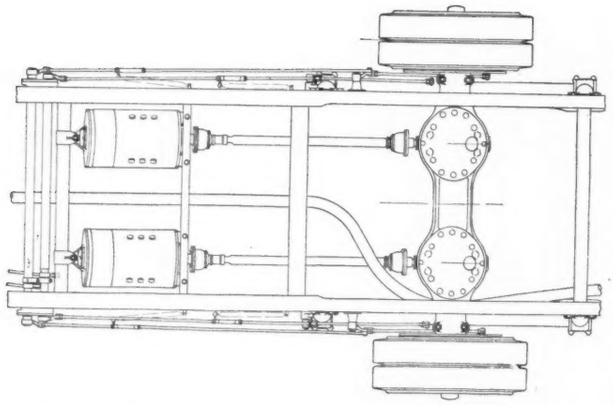


Fig. 4—Two-motor drive, each motor independently geared

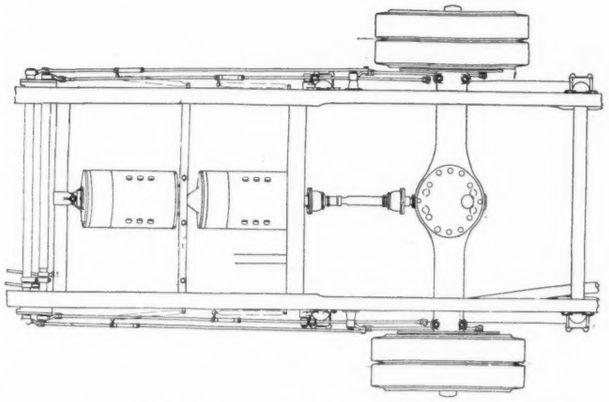


Fig. 5—Two-motor drive with motors arranged in tandem and driving through a single pair of gears

rent generated by it was used to excite the field of the main generator. This scheme seems to have been given up again, however, probably because it involved unnecessary complication.

At the present time the generators are provided with an auxiliary field winding supplied with current from the lighting battery, which produces a magnetic field of sufficient strength so the generator can pick up promptly as soon as the throttle is opened. The greater part of the magnetizing force comes from a shunt coil, however. In fact, in the system of the General Electric Co. the auxiliary exciting coil or teaser coil is connected in a series with an automatic cut-out and the circuit is opened as soon as the voltage of the generator reaches a certain value. Fig. 3 shows a diagram of connections of the Westinghouse system.

Commutating Poles

In addition to the teaser field there is a third field winding on small commutating poles located between the main field poles. These commutating poles serve to make possible sparkless commutation under all load conditions. In an electric generator the ends of each armature coil (or of a series of coils) are connected to adjacent commutator bars. For an instant while both of the bars to which the coil is connected are under a brush, the coil is short-circuited, and if any voltage at all is being induced in the short-circuited coil, a current will flow in it. In order to insure sparkless commutation, this current should be of the same magnitude and flow in the same direction as the current which must flow through the coil after the short circuit is broken. This means that the current and induced voltage of the short-circuited coil must vary with the load on the generator. Hence, commutating poles are so located that the armature coils are under their influence while short-circuited, and these poles are provided with series field windings so that their strength varies with the load on the armature.

Single Motor vs. Two Motors

In connection with the motors, the question arises whether one or two should be used. One motor evidently has the advantage from the points of view of first cost, weight and simplicity. There are, however, a number of advantages connected with the double-motor system. Double motors may be applied in two different ways. Each motor may be independently geared to one of the driving wheels, as shown in Fig. 4, in which case the differential gear may be dispensed with. In this case, however, two bevel or worm gear reductions are required and the axle has to be made of special design, which detracts from the advantages. The other method consists in coupling two motors end to end and driving through a single propeller shaft and a differential, as shown in Fig. 5.

One advantage in using two motors as compared with the use of a single one is that in the former case, if one motor should become defective, the bus could complete its route on the other one, thus obviating the need for towing due to motor defects. But since generator and engine defects, etc., would still call for towing, the degree of immunity would not be greatly increased. The chief advantage of double motors undoubtedly resides in the possibility of connecting them to the generator either in series or in parallel. When connected in series each motor will have only one-half of the generator voltage impressed upon its terminals and will therefore run at a low speed, about one-half of the speed as when connected in parallel. On the other hand, each motor will then take the full current of the generator and therefore produce twice the torque as if it were connected in parallel with the other and received only half of the generator current. The motors may not be capable of taking the whole of the generator current continuously without over-heating, but for short periods of heavy pulling additional torque can be obtained in this way.

Weight is an Objection

One serious objection to the electric transmission is the great weight of its components, and the designers naturally are bending every effort toward reducing this weight. Taking the generator and motor or motors alone, the weight varies from about 24 lb. per engine hp. for the smaller sizes to about 18 lb. for the larger sizes. For the sake of comparison it may be pointed out that modern six-cylinder bus engines weigh only about 12 lb. per horsepower. The electrical system, of course, replaces the clutch and transmission and thus eliminates the weight of these parts, but this saving is probably wiped out by the additional frame weight required to support the heavy electrical units. It may be possible to save a fraction of the flywheel weight, as the generator armature has considerable inertia and, besides, the engine does not have to operate at such low speeds as with mechanical drive, and therefore not so much flywheel capacity is required.

The capacity of electrical machinery in general is limited by heating. There are two principal kinds of losses in electric machines which determine this heating—the copper losses (or C^2R losses) and the iron losses (or hysteresis and eddy current losses). As with other power machinery, in order to get the most power from a machine of given dimensions, and therefore of a certain weight, it is necessary to operate at high speeds. Generator rotative speed is limited by engine speed, but even with this restriction something can be gained by using armatures of fairly large diameter and increasing the number of poles. The strain on armature banding, however, limits the armature diameter.

Low Resistance Armatures

The greatest current draw occurs during acceleration. Motor buses in city service, where frequent stops have to be made, must be capable of a fairly high rate of acceleration in order that a good schedule may be maintained. In fact, more rapid acceleration is one of the chief claims put forward in connection with the electric drive. (See Fig. 6.) The acceleration need not be as high as that of high-powered passenger cars, but a maximum acceleration of 2 m.p.h.p.s. should be attainable with a moderate passenger load. In order to make it possible to obtain the high current necessary for such acceleration with generators and motors of moderate weight, it is necessary to keep down the armature C^2R losses. In other words, the armatures must be designed to have a low resistance.

In order to obtain this low resistance it is necessary to put a large amount of copper on the armature, and that can be done only by reducing the amount of iron in the core. This involves higher magnetic densities which tend to increase the iron losses. These latter losses, however, are a function of the speed, and during periods of acceleration the motor speed at least is below normal, so these losses are not so serious as the copper losses. If an electric drive were specially designed for use on long-distance buses, in which both generators and motors would run at their maximum speed most of the time, it would evidently be advantageous to reduce the armature losses under these conditions by using more iron and less copper in the armature.

In addition to making efforts to keep down the losses, and consequently the heat generation, designers of electric transmissions provided means for getting rid of the heat as quickly as possible. It is naturally rather difficult for the armature of a completely inclosed electric machine to dispose of the heat generated in it, and a ventilating system is provided.

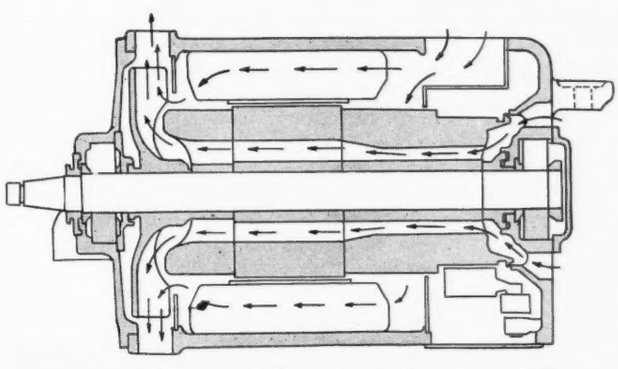


Fig. 7—Diagram of generator and motor ventilation (Westinghouse)

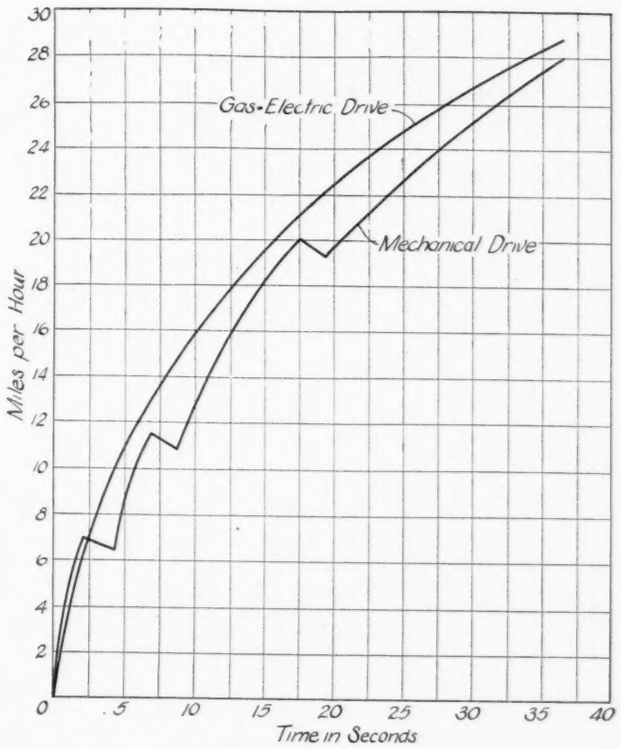


Fig. 6—Comparative curves of acceleration of Mack buses with mechanical and electric drive. (The mechanically-driven bus weighed 18,000, the electrically-driven one 20,000 lb.)

Fig. 7 illustrates how the ventilating system is arranged on the Westinghouse machines. A centrifugal fan is arranged on the driving end of the armature and expels the heated air from the housing of the machine through a circular series of openings therein. There are two sets of air inlets and two passages for the air through the machine. Air entering through a large screened opening at the bottom of the housing at the commutator end passes through the spaces between field poles to the driving end, and particularly cools the field coils. A shield is placed over the commutator, so that this air, which is likely to carry dust—and in wet weather moisture from the wheel splash—cannot come in contact with the commutator and brushes. There is another series of air inlets in the housing around the bearing at the commutator end, and air entering through these openings pass through a spider supporting the armature core on the shaft. Finally, to prevent injury to the machines from excessive heating in very severe service, the insulating materials used are chiefly such as are not affected by heat; that is, mica, asbestos, etc.

Fig. 8 shows the method of ventilation on General Electric machines, a double ventilator fan being used of which one section draws air through the field coils and the other through the armature ventilating tunnels.

Efficiency

One of the first questions generally asked when electric drive is discussed is with regard to the overall efficiency that can be obtained. With a mechanical transmission, when most of the driving can be done on the direct drive, the transmission losses amount to only a few per cent, and even in the lower

gears the efficiency is between 85 and 95 per cent. When the energy has to be converted from the mechanical to the electric form and then back again, the losses naturally are considerably greater.

A curve giving the overall efficiency for a certain

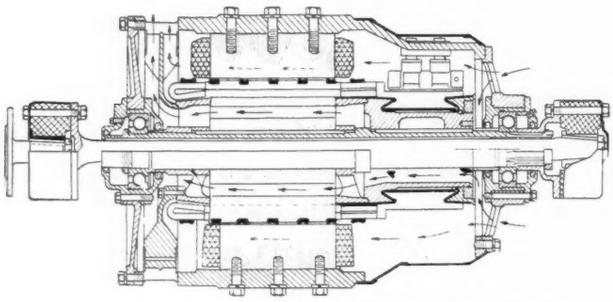


Fig. 8—Diagram of generator and motor ventilation (General Electric)

generator and motor combination is shown in Fig. 9. It will be noticed that the efficiency varies between 65 and 75 per cent for the greater part of the range of current flow, while for very large currents it drops below 50 per cent. There is therefore a decided difference in favor of the mechanical drive from this point of view. But in bus operation, the same as in connection with private cars, fuel cost is only a small factor of the total operating expense, and if the public appreciates the smoother acceleration of the electrically driven bus, the slight extra fuel cost will not stand in the way of the adoption of the drive. It has been pointed out, moreover, that a comparison of the efficiencies of the two systems as determined on the test stand does not give a correct view of the actual efficiencies.

The best plan is to compare the fuel consumptions of machines of equal carrying capacities when operating over similar routes. Apparently this would place the electric drive at a further disadvantage because the electrically driven bus always weighs considerably more. Mr. Atwell in his paper stated that the fuel consumption with electric drive is from 10 to 20 per cent greater. One would expect the difference to be even somewhat greater, for the electrically driven bus will weigh at least 10 per cent more.

When there is no direct mechanical connection between the engine and the driving wheels the engine cannot be used as a brake. The electric motor, however, lends itself to the same purpose. It can be used either as a mild brake, to prevent the bus from attaining too high a speed in descending a grade, or as a severe brake for emergencies. In the first case, the motor is merely disconnected from the generator and its circuit is closed through a resistance. The braking power obtained depends on the resistance in circuit and may be made variable if desired, the same as the braking power of an engine can be varied by means of the throttle. Ordinarily, however, only one step is provided. Emergency braking is effected by connecting the motor to the generator in the reverse way with a resistance in circuit. The braking effect then depends on the throttle position and can be controlled by means of the throttle. Connections for service braking in the General Electric system are illustrated in Fig. 10.

The generator and motor of an electric transmission system must be designed to fit the engine with which they are to be used. The engine operates

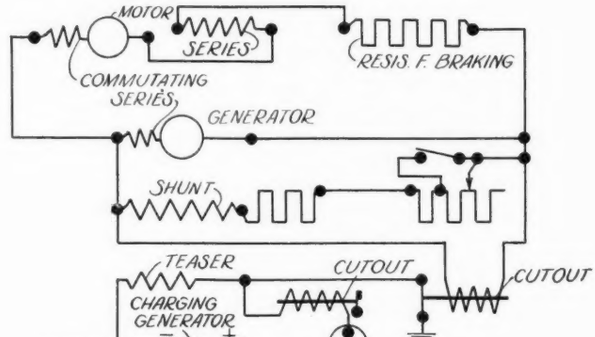


Fig. 10—Circuit diagram of General Electric System when braking

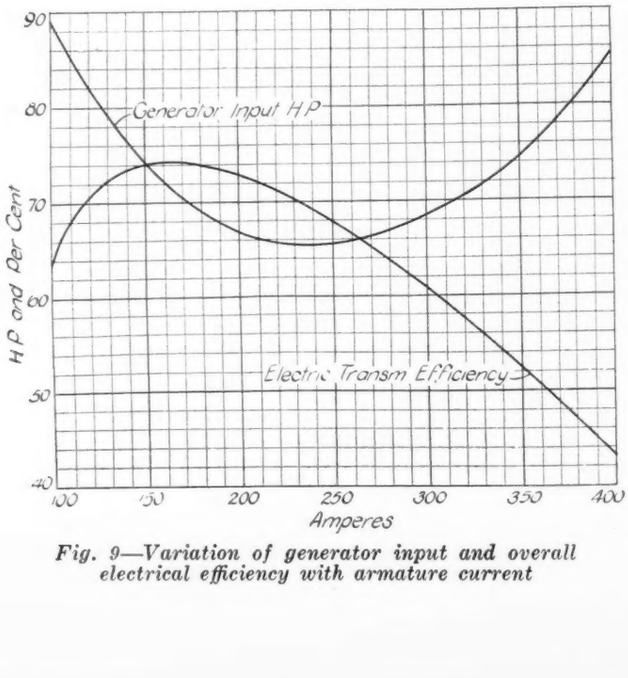


Fig. 9—Variation of generator input and overall electrical efficiency with armature current

without governor and attains a speed which is determined by the load on the generator. The electrical system is so designed that the generator over the greater part of the operating range loads the engine to about 85 per cent capacity, based on bench tests of the new machine, which leaves a satisfactory margin for loss of power due to any of the various possible causes.

The speed to which the engine is held down ordinarily is not that at which it develops its maximum power but a considerably lower speed; if the engine were habitually operated at the peaking speed its life would be short. However, occasionally it is desirable to operate the engine at or near its peaking speed, and a simple means of accomplishing this is available with the electric transmission system. All that is necessary is that the engine torque load be reduced, which can be accomplished by reducing the generator field strength, since the driving torque of the generator is proportional to the armature current and the field strength. Therefore, a resistance for the shunt field circuit of the generator is provided which is ordinarily cut out by means of a switch (see

(Continued on page 845)

Bureau *of* Standards *Begins Testing* of New *Airplane* Motors

No standard requirements as to fuel and oil consumption or weight per horsepower, but sound design, adequate materials and reliable performance demanded.

AIR commerce regulations providing compulsory tests and ratings by the Department of Commerce for all motors designed for use in planes engaged in interstate commerce has brought a new and broadened field of operations to the Bureau of Standards, which is assigned the job of testing the new airplane motors.

The air commerce regulations provide that all airplanes considered as airworthy and permitted to engage in interstate air commerce must contain powerplants approved and rated by the Department of Commerce. Each new type of commercial airplane motor therefore, a statement from the Bureau of Standards announces, must pass certain tests before it can be certified as airworthy by the Director of Commercial Aeronautics.

Officials at the Bureau of Standards emphasize the need for careful enforcement of the new regulations by pointing out that the planes in commercial use until recently were planes with motors designed primarily for military use and adapted to commercial utilization. The engines used in military planes had already been thoroughly tested by the Army or the Navy.

Advent of the new era of distinctly commercial motors for planes, accordingly makes it necessary for rigid inspection of new designs. Several type tests have already been made by the Bureau of Standards. Most of these were in the laboratories of the bureau at Washington, although in some exceptional instances the tests were at the manufacturer's plant under supervision of engineers from the bureau.

Before any plane motor is accepted for test the engine must have been run by the manufacturer for at least 25 hours, and a log of this run must be submitted with the engine. The department's present test requirements are, first, a 50-hour endurance run, split up in five-hour periods; second, full throttle runs to determine power developed at speeds ranging from 75 to 110 per cent of normal motor speed, and third, an actual service test of the engine installed in the airplane.

Dynamometer to be Used

Engines thus far submitted for tests have been air-cooled and they have been mounted on a torque stand for the endurance test and power runs, suitably designed propellers absorbing the power and at the same time producing sufficient air blast to cool the cylinders. As soon as necessary equipment can be installed, the tests will be made in a dynamometer laboratory at the Bureau of Standards, using an electric dynamometer to absorb the power in lieu of the power-absorbing propellers. It is contemplated to install an 80 hp. blower to cool the engine.

Thus far the Warner seven-cylinder motor, of Detroit; the Kinner five-cylinder, of Glendale, Cal.; the Comet seven-cylinder, of Oakland, Cal., and the Szekely three-cylinder, of Holland, Mich., have been tested or are now under test at the Bureau. Each of these is a fixed radial air-cooled powerplant. Scheduled for tests during the next two months in the order named are the following fixed radial air-cooled engines: Velie five-cylinder, of Moline, Ill.; the Floco seven-cylinder, of Los Angeles, and the Menasco-Salmson nine-cylinder, of Beverly Hills, Cal.

Each powerplant is considered on its own merits and there are no standard requirements as to weight per horsepower, fuel consumption or oil consumption per horsepower-hour.

The bureau does demand, however, sound design, adequate materials, good workmanship and reliable performance of the engine and its accessories.

The endurance test, in accordance with Army and Navy practice, consists of nine periods (totaling 45 hours), at rated speed and load and one period (five hours), at 10 per cent overload.

Although testing of commercial airplane engines has only recently been undertaken by the Bureau of Standards, the automotive section of the bureau has been studying performance of aircraft powerplants for more than 10 years.

A WORK dealing with the development of the "airless" Diesel engine on the basis of patent literature has been published in Germany recently (Die Kompressorlose Dieselmaschine, by Ludwig Hausfelder, published by M. Krayn, Berlin W.). Diesel engines with other than air injection had their origin outside Germany and were taken up in that country only after the war. Since that time, however, a great deal of effort has been devoted to this somewhat narrow field and many claims have been staked out. To those active in this particular line of endeavor it is evidently of value to have available a work which summarizes and critically illuminates the patents on airless injection which have been taken out in Germany, England, France, Switzerland and the United States. It will serve as a guide and prevent the useless reworking of fields that have been exploited already. The subject, moreover, is handled by a man who is thoroughly familiar with it from a practical standpoint, and the book is far more readable than the average collection of patent abstracts.

THE Royal Automobile Club of Great Britain has refused to sanction a speed trial which was planned by Capt. Malcolm Campbell at Pendine Sands, Wales, in an attempt to regain the world's one-mile speed record now held by Ray Keech. The club took the stand that the Pendine course was too short for such a test. It is seven miles long.

Parts Makers and Dealers *Financed Car* Companies *in* Early Days

Lawrence H. Seltzer, writing financial history of automobile industry, finds that many big manufacturers got start by making use of fixed capital employed in other fields.

By John C. Gourlie

NOW comes a book, "A Financial History of the American Automobile Industry," by Lawrence H. Seltzer, (Houghton, Mifflin Co., Boston, $3.00), which gives, with painstaking attention to statistical detail, the progress to financial affluance and stability of the industry and a number of its leading companies. The author's laudable enthusiasm for the facts has brought him far from the romantic generalizations of most of the historians of the business and produced a volume not only worth careful reading but also worth keeping for reference on matters not otherwise readily accessible.

Although primarily concerned with the details of financial growth, Dr. Seltzer's work is notable for its recognition of the paramount importance of parts makers in enabling the expansion of automobile manufacturing enterprises from tenuous beginnings, inadequately capitalized and under-equipped. In the early days, before specialization became the rule, the pioneers were able to call upon machine shops for parts which were shipped on credit, assembled by hand and sold for cash. Without such assistance, the expansion of the industry undoubtedly would have been at a much slower rate.

Backed by a wealth of authentic information, Dr. Seltzer is able to take issue with those who have seen the automotive industry as the graveyard of enterprise. Noting the long tabulations of companies that failed, he points out that very few ever actually produced an automobile but most died in the promotion stage. He further shows that of the companies now existent only one is the outcome of a receivership. The receiverships that used to occur caused small losses. He recognizes that conditions have changed, but he maintains that in the early changes the new industry offered an exceptional opportunity to men of ability who did not need much capital to make a success of the business.

As an economist, the author is primarily concerned with the question of mobility of capital; how, specifically, a new industry presenting unknown hazards to the investor can obtain the means for establishment and growth. He finds that the foundation of the automobile business was not in the main due to the willingness of men to risk large sums of money, but rather was due to the manner in which fixed capital employed in other industries could be placed at the disposal of the builders of the new product, and financial assistance obtained from dealers.

Seeking confirmation on this point and others, Dr. Seltzer called upon many of the men who have established successful automobile companies. One of the results was this interesting comment by Roy D. Chapin, chairman of the board, Hudson Motor Car Co.:

"It is said that the Ford Motor Co. started with $28,000. We started with much less than that . . .

"Dealers' deposits often paid half the sum necessary to bring out a full year's production; and if the assembling were efficiently directed, drafts against the finished cars could be cashed as rapidly as the bills from parts makers came in . . .

"We sold directly to distributors from the first. We looked for individuals of substantial capital and financial responsibility who would be sure to fulfill their engagements."

Mr. Chapin was speaking of conditions that endured as late as 1909. Unquestionably the industry had some unusually favorable factors to aid its growth.

Dr. Seltzer traces in detail the development of the Ford Motor Co., showing how, once having made a small start, it was able to finance its expansion through the retention of earnings. But he also is able to demonstrate that other companies followed

Net Aggregate Reinvested Profits as a Source of Present Tangible Invested Capital

Company	Tangible Invested Capital*	Net Aggregate Reinvested Profits
Ford Motor Co.	$694,384,502	$694,344,502
General Motors Corp.	593,107,999	306,221,101
Dodge Bros., Inc.	114,978,609	101,728,609
Studebaker Corp.	99,226,556	71,797,967
Packard Motor Car Co.	46,390,943	45,990,944
Hudson Motor Car Co.	43,078,016	42,748,026
Nash Motors Co.	38,563,350	32,227,499
Reo Motor Car Co.	27,993,424	27,693,424
	$1,657,723,399	$1,322,752,071
Reinvested profits to invested capital		79.79 per cent

* At end of calendar or fiscal year, 1926. Includes equities of minority stockholders in "consolidated companies," in the case of General Motors, and equities of bondholders and noteholders in the case of Dodge Bros.; otherwise denotes net tangible assets applicable to capital stock.

much the same practice. In a few of the present leading organizations there are records of financing through stock sales and expansion through mergers with other companies that may, or may not, have been financed by banking or public participation, but all are to a large degree the product of reinvestment of earnings. This is brought out in the accompanying table, which is evidently regarded by the author as the most important result of his study.

Commenting on the records of six of the companies listed in the table—those exclusive of Ford and General Motors—Dr. Seltzer says:

"The financial practices and policies of the six enterprises reviewed in this chapter are widely representative of virtually all the types of financing employed by successful American automobile producers.

Studebaker Had Good Start

"The Studebaker Corp. alone, of the six, started with a relatively large investment in fixed plant—an investment derived chiefly, from the earnings of the Studebaker wagon and E M F automobile enterprises. Up until 1926, only two of the six companies, the Studebaker and Packard, had found it necessary to resort to the financial markets to meet expanding capital requirements. With the exception of the Dodge enterprise, since 1925 they are the only ones, likewise, which have had frequent resort to borrowed funds for long or short term periods. Two of the six had been able to retire original issues of perferred stock out of earnings; two others (and the Dodge company prior to 1925) had issued only a single type of security, common stock; and the present invested capital of all of them, and very particularly of five out of the six, has been largely derived from reinvested profits."

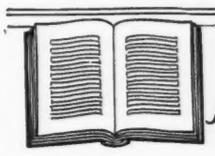
Summing up the conclusions of his study, the author writes:

"A new product may command capital resources not only by diverting these from other goods, but also by effecting the utilization of hitherto idle utilities residing in existing capital equipment. Such increases in the efficiency of capital are tantamount to absolute additions to the stock of capital; and while they are rarely reflected in pecuniary measurements, they may be of great practical importance, particularly in a period of improving technology. Some of the capital early devoted to automobile production came from the idle resources of machine shops and similar establishments, which added automobile components to their lines of products without, at first, diminishing their output of other goods or increasing their capital equipment.

"Speaking broadly, we may say that a wide distribution of capital among industries supplying raw materials, subproducts, and various kinds of services, and an improving technology, facilitate the mobility of capital. The concentration of capital in highly integrated industries, on the other hand, would seem to render capital less mobile. If, 25 or 30 years ago, industrial practice had required that each final product be produced by a highly integrated enterprise that directly controlled the sources of the raw materials and all the intermediate manufacturing stages, entrance into the automobile industry necessarily would have entailed a considerable measure of concentrated risk."

A NEW edition of the Hand-Book of the International Automotive Industry, which was first published in Germany last year, has recently come from the press. The text is in three languages, English, French and German. It comprises a short historical sketch of every automotive company in the world producing vehicles or accessories and parts, data concerning their products together with prices, information as to financial status, names of directors and managers, bank connections, agencies, etc. Also a number of companies now extinct are listed.

The makers are classified according to nationality, but an alphabetic index of all makers together is provided together with a national index. The book has close on 1000 pages and is bound in canvas. The publishers are Finanzverlag G.m.b.H., Berlin, C.2.



Books for the Business Bookshelf

Scientific Purchasing

Edward T. Gushee and L. F. Boffey. McGraw-Hill Book Co., New York. 196 pp. $3.

PURCHASING has always been and is still a very important factor in manufacturing operations, one which has considerable influence upon the profit and loss statement. In the present book the authors have endeavored to set up the fundamental principles upon which, they believe, successful purchasing practices must be based. Routine methods in typical purchasing departments are not given, but rather there has been an attempt to lay a foundation for such routine. After reviewing in detail the seven principles which the authors assign to the makeup of scientific principles, the book is devoted to rather full discussions of various purchasing details such as specifications, inspection, salvage and scrap, storing and traffic and similar related topics.

Abrasive Handbook

Fred B. Jacobs. The Penton Publishing Co., Cleveland. 547 pp. Illus.

GRINDING has become a very important manufacturing practice during recent years but the literature concerning it has been rather scanty. This book will serve admirably to fill the need for more complete and readily available information on all phases of grinding. It contains rather full information on abrasives and grinding practice, its chapter headings including: Abrasive material, cylindrical grinding, diamond data, disk grinding, grinding machines, grinding practices, grinding wheels, honing practice, and polishing and buffing. The arrangement of the material could be improved considerably and the proof-reading and illustrations are not very good, but these are minor points when compared with the really vast amount of practical grinding information which one can get from the book.

Robb's Patent Essentials

John F. Robb. Funk & Wagnalls Co., New York. 446 pp. Illus. $5.

THIS is a second edition of a rudimentary treatise on patents which has been helpful to executives, engineers and inventors who wish to know more about the nature of patents, the mechanism of their procurement, drafting of patent claims, conduct of cases and other matters related to the subject. The second edition has been brought about mainly because of the changes made in patent laws in 1927, but in addition to bringing the old material up to date, added material has been included to make the book still more valuable. Important among these items are papers by five patent examiners covering various phases of the subject from their viewpoint.

Special Jobs Performed *on* Screw *and* Drilling Machines

Interesting adaptations made in automotive plants to drill and countersink door hinges and also for drilling and tapping operations. Davenport machines used.

TWO interesting adaptations of machine tools have been made in automotive plants to perform special jobs more effectively than has been possible heretofore. In one, the non-stop, automatic drilling machine, made by Davenport Machine Tool Co., Rochester, N. Y., has been utilized for drilling and countersinking three holes in the door hinge of an automobile.

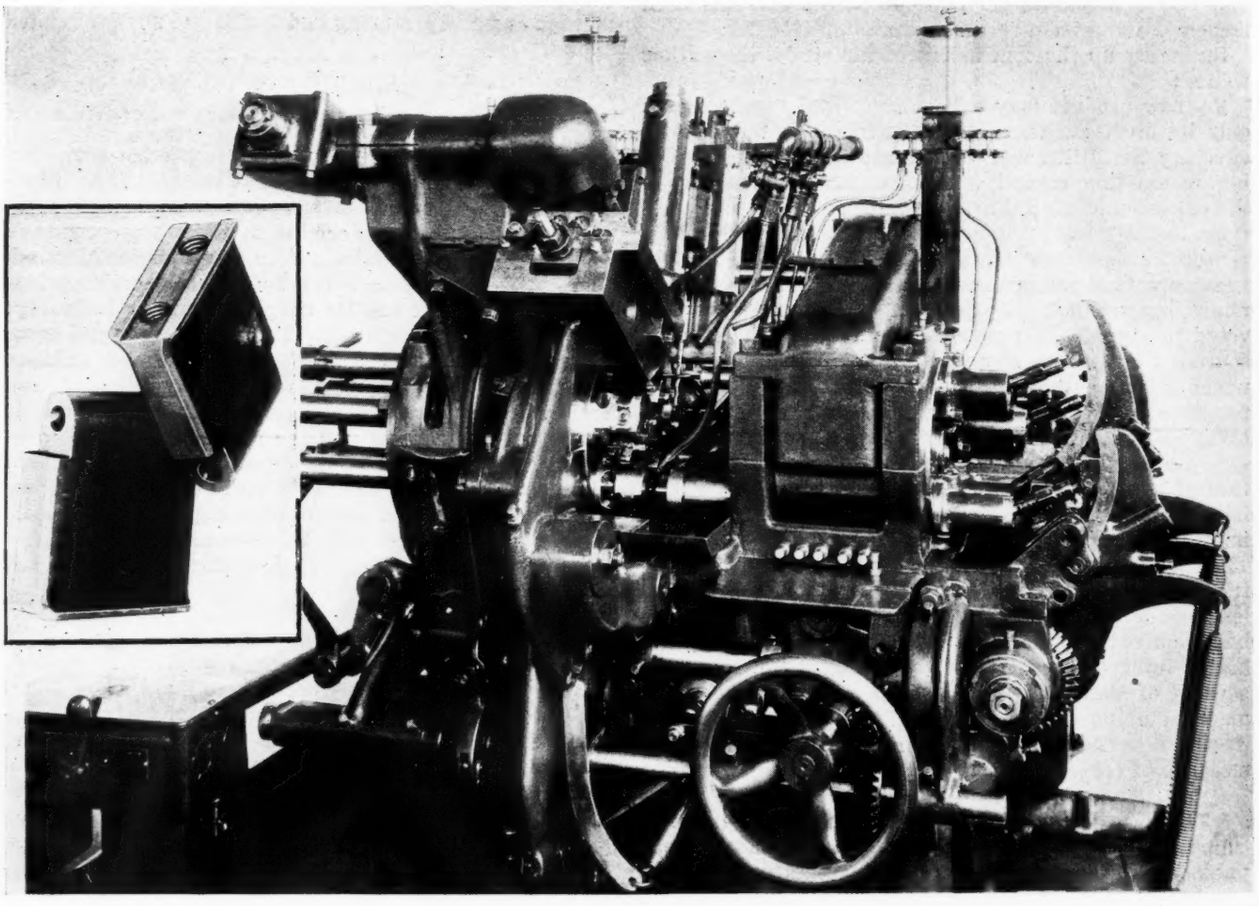
The machine design provides five sets of workholding fixtures and drilling heads which are revolving continuously while the cutting and clamping operations are being performed. The operator places the work in the fixture where it is automatically clamped in proper location.

Three spindles in a cluster box drill and countersink the holes simultaneously, after which they are withdrawn and three more spindles approach and countersink the holes from the opposite side. Then the clamping device automatically releases and the finished parts are dropped into the pan beneath the machine.

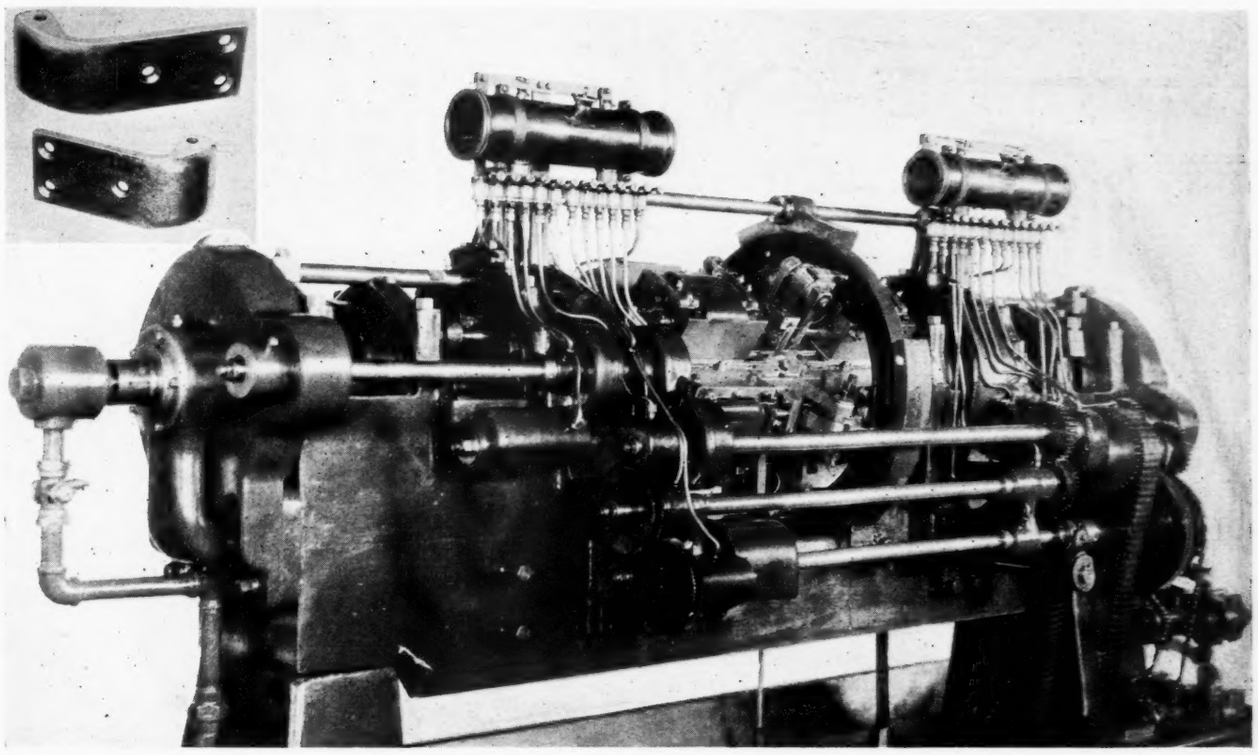
Four pieces are being worked on constantly so that production is rapid and in fact is limited only by the ability of the operator to place work in the fixture during one-fifth of the time required to revolve the fixture holder.

The second special adaptation is that of an automatic screw machine, also of Davenport make, for drilling holes in an automobile hinge as shown in an accompanying illustration. The most interesting feature of this is that, contrary to usual screw machine practice, the work is held stationary and the tools revolve about it.

The hinge is placed in the position usually occupied by the work spindle and is clamped by a lever. The pin



Modified Davenport screw machine for drilling hinge holes. Inset—Work done in modified screw machine



Davenport non-stop, automatic drill set up for drilling and countersinking door hinge holes. Inset—Work performed in the automatic drill

hole is drilled by rotating the drills on the right-hand end, the first drill being guided by a bushing close to the work and drilling about 1/3 of the depth. In succeeding operations other drills complete the hole and it is then reamed.

During these operations the drill spindles mounted on the cross slides drill the holes for fastening the hinge to the car body, one set going part of the depth, the second set finishing the holes and the third set tapping them.

While these last holes are but 1 in. apart, the drill spindles are arranged so that the driving gears are of fair size and each spindle has an independent lengthwise adjustment for length of drill.

The longest hole drilled is 1⅜ in. and the hinges are drilled and tapped at the rate of 260 to 400 per hour. This same method is said to be adaptable to a wide variety of work.

Inspecting Lincoln Cars Prior to Shipping

BEFORE shipping cars of the type built by the Lincoln Motor Co. it is essential, of course, that great care should be taken to have every part of the car as near perfection as it is humanly possible to make it. The final inspection operations which each Lincoln car passes through naturally are very thorough and complete.

The first item which may be included as part of the final inspection program is a road test made on each chassis as it is completed. The chassis has a dummy body mounted on it and is run at varying rates of speed over a track which is about a mile in extent and adjacent to the plant.

One-half of this track is part of the road serving the factory and is hard surfaced and relatively smooth. On this, the chassis is tested for acceleration, speed, etc. The other half of the track is across rough ground where no effort has been made to provide a smooth surface. The road is full of pot holes, ruts etc.

Driven over this road at speeds up to 50 and 60 m.p.h., the chassis is given a rather severe test of its rigidity and general strength. After returning to the factory each chassis is carefully examined to learn if the road test has developed any weakness or looseness; if not, it passes down the line and receives its regular body.

As each completed car comes off the line it is placed on one of several mechanisms designed to test the body and chassis for general strength. These mechanisms consist of four rollers protruding slightly above the floor surface, each one having its center offset about 1½ in. The cars are run on these rollers under their own power and at varying speeds, the result being a very severe racking movement which quickly shows up any spring weaknesses, poor shock absorbers, squeaks, rattles, or anything else which might develop in service.

After this test the brakes are adjusted by means of a standard Cowdrey brake testing machine and the completed car is given another road test over the factory track.

If nothing develops during the road test to cause the car to be sent back to the factory for repairs or adjustments, it passes to the shipping room where the headlights are adjusted and tested by means of targets against which the rays from the lights are directed.

Following this the car passes under a very strong battery of spot lights while inspectors go over every inch of the surface to detect flaws in the finish.

THE FORUM

Airplane *Engine* Industry Pictured *in* Two Separate Divisions

One will specialize on powerplants for large commercial planes while other will supply needs of smaller pleasure craft, says Wright engineer.

Editor, AUTOMOTIVE INDUSTRIES:

The article by Mr. Hardecker in the May 12 issue sounds a note which has been sensed by many who have been close to the aeronautical industry and watched the public's reaction to its progress during the past two years. In resonance with it are Capt. Brewer's remarks in the same issue.

The prophetic nature of the first-mentioned article invites some comment which may be in the nature of tempering some statements with the oil of some years of engine design experience.

It is quite logical to agree, that, in visualizing commercial and pleasure flying as it must, in the light of automobile history, come to be, one must assume a powerplant available at a cost one-tenth that of the current one. But it is equally logical to reason that a mere touch of the wand of big business interests cannot be expected to materialize the vision no more than was the cost of automobile powerplants cut suddenly to a tenth of original production cost by application of unlimited capital. The Ford outlay for tool equipment for the Model A was a move which had some considerable precedent and the background of some years of experience with the market's needs.

So we can hardly expect the aircraft engine to be suddenly shot into the price realm of automobile power units by some such "golden touch" alone.

Aided by Governments

It must be said, however, that the development in design, over a given period, as seen in the two fields of transportation, are not by any means parallel. This is readily understood from the fact that aircraft development has been so finely fostered by the Air Services of our own and other governments. Engineering progress has been made possible which would have required a great deal more time in the automobile field.

So we do find the aircraft engine as it stands today in a state of development which very well warrants consideration by large financial interests. Although it is not quite fair to say that the engineering phase is finished and that we can now turn the powerplant over to such quantity production as will market it at a tenth of its present price, the writer submits that an intermediate state of engine and market does exist and out of it will emerge such large scale production programs as we are now well used to seeing launched and proved out on the automobile market.

This intermediate phase of production is right now defining itself in an effort to supply plane builders with an air-cooled powerplant of proved, basic design, but in construction a compromise of specific weight with cost. The specific weight factor is the extremely low one established by military practice, where cost is a secondary consideration. The extent of this compromise is largely dependent upon cylinder bore and nature of service required of the engine.

Small Cylinders Cheapest

It works out that cheap construction is more readily applied to cylinders of small bore. This is the cylinder that will logically be employed to power large numbers of small planes in which first cost is a prime consideration. Thus we may expect to find the engine required for this type of service fitting its place in the market particularly well as the result of its natural adaptability to low-cost production.

On the other hand, we find engines of large bore and subsequently more costly detail construction naturally applicable to planes operated under conditions where either the first cost is of secondary importance as a matter of affluence of the private owner, or the nature of transport service in which the engine is used calls for a high power-weight ratio and warrants the higher first cost of such. That this class of powerplant will be in large demand by transportation interests is plain.

So, on this basis one might venture to forecast a sort of segregation of aircraft engine building. The pioneer concerns in the line, having the background of production experience in military types find themselves in a natural position to supply units of medium and large power for passenger and express lines, while the production of small engines built, frankly, down to a price, falls naturally to the facilities of manufacturers of car engines, machine tools or commercial power units. In the matter of powerplant size, it is reasonable to expect that these two classes will tend to grow further apart as aviation progresses, this is due to the fact that

the refinement in plane design and development of wing sections is making it possible to carry more and more load with a given powerplant. In the pleasure plane class, where first cost is important, advantage will be taken of this and smaller and cheaper engines result.

In the transport field, where additional load capacity will always be a goal, it is likely gains in plane efficiency will be taken as a means to that end. And if the present trend in air-cooled engine development holds, one may look for powerplants of twice the present size.

A class of commercial planes of medium size, operated by private concerns on short carriage, corresponding to auto truck usage, will no doubt fill the gap between pleasure flying and transport work. This calls for a powerplant which also must meet a rigid requirement on power-weight ratio and therefore we might logically expect the sources of such units to be those engine builders who supply the large scale transport interests.

WALTER E. WEEKS,
Designing Engineer,
Wright Aeronautical Corp.

European Air Treaty

AN air service treaty has been entered into between France and Spain. The following aerial services are recognized and authorized by this treaty: Spanish lines: Spain—Spanish Guinea, with branch to Cape Juby in the Canaries; Barcelona-Geneva by way of Marseilles and Lyon; Madrid-Paris. French lines: France-Dakar with branch to Alicante-Oran; Marseilles-Algiers, with intermediate landing on the Balearic Islands; Paris-Madrid.

All of these lines over the whole of their route are authorized to engage in the commercial transportation of goods from and to the two contracting countries. This authorization for Spanish territory was greatly missed heretofore by the French Latecoere Company, now known as Compagnie General Aeropostale. Also, the possibility of effecting landings on the Balearic Islands will greatly advance the Marseilles-Algiers air line project. Both France and Spain have the right to open a service between Paris and Madrid, as soon as convenient and each for its own account. But the agreement provides that as soon as circumstances permit a Spanish-French company will be organized which will operate a joint service.

Gas-Electric Drive

(Continued from page 838)

Figs. 3 and 10). This switch is controlled by a pedal, and when it is desired to speed up the engine and secure the advantage of the additional power which it will generate at the higher speed, the driver need only press down on the pedal, thereby including the resistance in the field circuit.

Generator Installation

There are various possible methods of installing the generator and connecting it to the engine. The mounting method must be such that there is no possibility of binding of the bearings and that the individual units can be readily removed from the bus. One method consists in securing the generator to the engine crankcase by means of an adapter casting. If the surfaces of the joint are piloted or telescoped and the work is accurately done, continued accurate alignment is assured. This arrangement would seem to be well adapted for use where the generator set is arranged crosswise of the frame in the rear, as in several late designs of the street car-type bus.

Fabric-disk universal joints are used to a considerable extent for connecting the crankshaft to the armature shaft. These are noiseless in operation, permit slight inaccuracies in mounting and have a cushioning effect. In some designs the engine and generator are mounted together on a subframe and can be removed with the subframe as a unit. Where a particularly compact unit is desired, as for cross

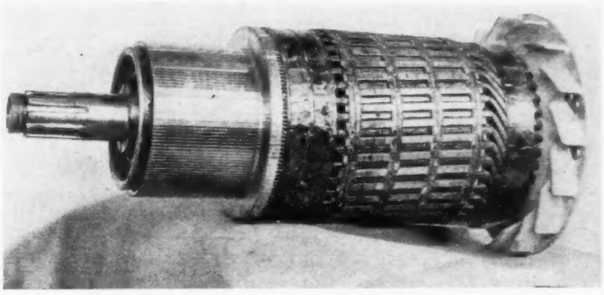


Fig. 11—Motor armature showing cooling fan and twisting of armature core teeth to insure noiseless operation (Westinghouse)

mounting, the driving-end bearing of the generator can be dispensed with by piloting the armature shaft in the end of the crankshaft, bolting the generator frame to the crankcase and supporting the generator set on the frame as a unit.

Long experience with direct-connected generators has shown it to be desirable to have a certain degree of flexibility in the driving connection between the engine shaft and the armature shaft, and the General Electric Co. in some of its installations has followed a practice first worked out in connection with turbine-driven generators (Fig. 8). The armature shaft is made hollow and a driving shaft of high-tensile steel and of comparatively small diameter extends through this hollow shaft, being connected by flexible couplings to the crankshaft and the hollow armature shaft respectively. This arrangement makes it unnecessary to have the generator and engine in absolute alignment.

In conclusion it may be well to summarize the advantages claimed for the electric drive by its sponsors, as given by Mr. Atwell in his S.A.E. paper:

1. Increased sustained schedule speed, resulting in more revenue bus miles per day.
2. Decreased driver's duties, resulting in a decrease in accidents and making the driver's job more attractive.
3. Smoother operation, resulting in increased patronage and longer life of engine, chassis and bus as a whole.
4. Greater freedom of bus body arrangement, the engine being mechanically free from the propeller shaft.

FRANCE faces a situation very similar to that of the United States in respect to railroad grade crossings. During a recent discussion in the Chamber of Deputies attention was called to the increasing number of accidents at these crossings. M. Tardieu, Minister of Public Works, replied that it would cost 13,000,000,000 francs to suppress the 32,000 railroad crossings on French roads, and that the work could not be undertaken because of the great expense involved.

Progressive *Traffic Control* Urged *in* Boston Survey

Expected to increase speed of flow in downtown district by more than 100 per cent. Through street plan also recommended in report by Dr. McClintock.

By K. W. Stillman

ONCE more detailed study and analysis of conditions affecting traffic congestion and accidents in a large city have resulted in a plan which promises to bring a great measure of relief.

The place where this has been accomplished most recently is Boston, whose narrow and crooked streets, in the business section at least, are notoriously built upon the paths traversed by the cattle of the early inhabitants.

In December, 1926, a street traffic advisory board was formed in Boston and this board engaged the services of Dr. Miller McClintock, director of the Albert Russel Erskine Bureau of Street Traffic Research, to conduct the same sort of studies as he had previously made in Los Angeles, Chicago, San Francisco and other cities.

This study has been completed and the results published in a 435-page book containing a vast amount of statistical information concerning the Boston traffic problem and definite recommendations for alleviating conditions including a complete proposed traffic code for the city.

While the problems involved in Boston traffic congestion are undoubtedly made up largely of items peculiar to that city only, the methods proposed to improve conditions are generally adaptable to a much wider range of situations and so should be of interest to those interested in traffic in other cities.

The survey covered approximately the same ground as those made in other cities by the Erskine Bureau, including detailed studies of traffic flow, reasons for delays, parking conditions, pedestrian movement, and similar factors which influence congestion in any degree.

Like most large cities, the major business activities of Boston are concentrated in a relatively small area into which there is a daily ebb and flow of foot, motor vehicle and trolley traffic of very large proportions. The location of Boston on a peninsula so that it is bordered by water on three sides adds still more complications to the problem of getting this traffic in and out of the central business district without great congestion.

Poor alignment of vehicles on Washington Street, Boston, causes pedestrian difficulties

The survey disclosed that a considerable part of the available street space is utilized at various times for the repair of public utility property under the surface. The cost of this work in time wasted and increased traffic congestion is so great that much stricter control over street openings was recommended. Upon streets so important to traffic flow that parking is prohibited it was suggested that no permits be issued for opening the street during the day except in cases of great emergency.

Want Jobs Finished Quickly

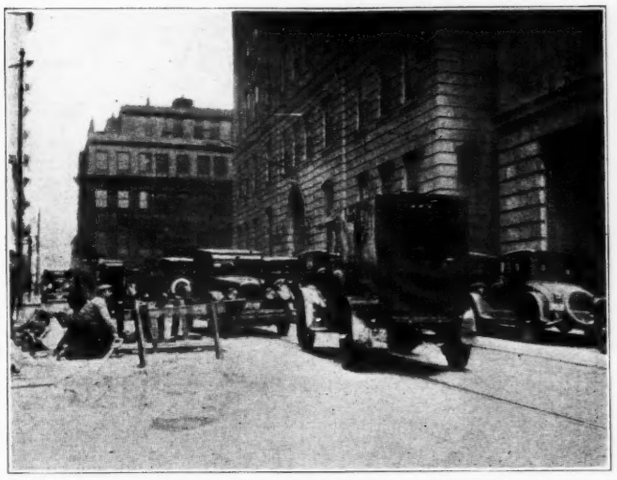
On less important streets, permits for street openings should be granted only when provision is made for at least two eight-hour shifts of workmen daily on the job so that the obstruction will continue for as short a time as possible.

Storage of building material on the street was found to be another prevalent source of congestion, of considerable more economic cost than the provision for storage off the street. Therefore it was recommended that no storage on streets be permitted in the downtown district and, in outlying districts, no storage or temporary buildings which cover more than 25 per cent of the street should be permitted. In this same connection it was recommended that storage of goods in the street should also be prohibited.

Because of the essential character of certain streets in the downtown district as major traffic flow arteries it was recommended that deliveries of any kind be forbidden between 8:30 a.m.

and 5:30 p.m. on some 17 streets in the central business district.

In considering the parking problem the report emphasizes the fact that parking is a privilege and not a right, so that there is ample justification to regulate parking to any necessary extent which will be of greatest benefit to the mass of citizens. As is the case in many cities, the survey showed that parking violations are very frequent; that the regulations already in force are not being operated to nearly full efficiency. It was emphasized that rigid enforcement of parking regulations is necessary to secure the benefits of proper control of traffic.



The Boston survey disclosed that a considerable part of the available street space is utilized at various times for the repair of public utility property under the surface. Stricter control over street openings was recommended

In designating parking restrictions there are four types which are used. The first, in which stopping the vehicle for any purpose whatsoever is forbidden, has been applied to no streets but has been suggested for various points such as within intersections, on crosswalks, between safety zones and curbs, within 25 ft. of intersections, etc.

The second class of restriction permits stopping for loading and unloading only and is applied to designated loading zones for vehicles, in front of schools, hospitals, hotels, theaters, etc., and to all stops at the left-hand curb of one-way streets.

The third class considered is parking for a definite time period. Investigation disclosed the fact that for those persons who park for the transaction of business, rather than for garaging their car on the street, a period of one hour is usually ample for their requirements. This being the case, all time limit parking has been confined to one hour in the report's recommendations.

One-Hour Parking Limit

It has been recommended that a one-hour limit be applied to all downtown Boston except for those streets where all parking is prohibited. Unrestricted parking is permitted in a few localities adjacent to the downtown district to provide facilities for those whose business requirements call for stops longer than an hour.

Live parking, or the stopping of cars which remain in direct charge of an operator, was considered a different type of parking and it was suggested that such parking be permitted in several of the most congested streets where other parking is forbidden.

While definite control of pedestrian traffic was recommended for all intersections controlled by traffic signals of an officer, the pedestrians to cross only on a go signal, it was believed that it might not be advisable to inaugurate such strict control at present. Instead it was suggested that provision be made for pedestrians to yield the right of way to all vehicles proceeding on a go signal, while vehicles should yield the right of way to pedestrians proceeding on a go signal.

The adoption of the through-street plan for a number of important thoroughfares was recommended not only to expedite traffic flow but to decrease accidents as well, since many accidents result from the sudden emergence of a vehicle from a small side street into a main street on which traffic may be moving rapidly.

The report recognizes the fact that misalignment of vehicles on the street considerably reduces its capacity. To overcome this condition the "keep to the right" principle was emphasized in the recommendations with the legalizing of passing on the right when the way to the left of the vehicle being overtaken is obstructed. At congested intersections it was recommended that traffic lanes be marked on the road for a distance of about 100 ft. behind the intersection to eliminate the confusion which often occurs when vehicles approaching the intersection fail to maintain proper spacing.

In the actual control of movement at intersections the report praised the results obtained by a competent traffic officer as being the best possible method, at isolated intersections at least. Where the conditions of one intersection have a direct influence upon those of others nearby, as is the case in the downtown district of most cities, a coordinated system of control by traffic lights was thought to be more efficient than any other.

It was recommended that all forward movement and both left and right turns should be made on the go signal.

The type of traffic control recommended for the downtown district is the progressive system which has been used with such great success in other cities. The first installation in Boston was recommended for Tremont and Washington Streets and a few of their major contributing arteries. A control plan has been mapped out whereby traffic in both these streets can progress at an average speed of 15 miles per hour without interrupting cross traffic in any way. This may be compared with the average present speeds possible on Washington Street of 7 miles per hour and on Tremont Street of about 6 miles per hour as indicated by extensive tests.

The report recommended that signals of the post type, mounted at the curb, be employed and suggested that the far right side mounting be used at all simple intersections since a single face would then give directions to both vehicular and pedestrian traffic.

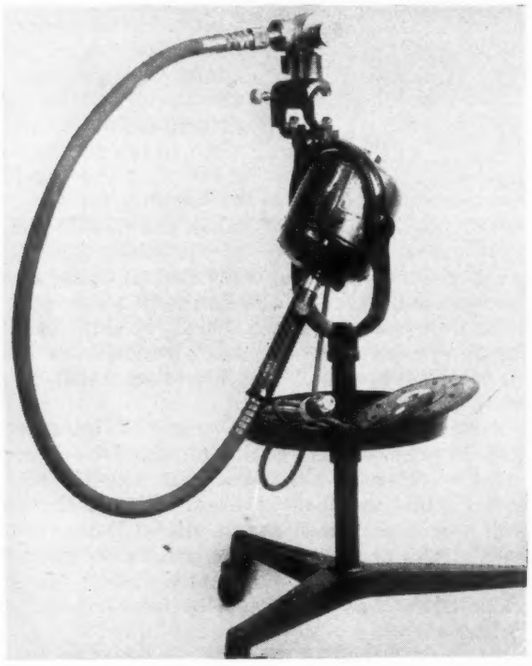
Included in the report were recommendations for obtaining better enforcement of traffic regulations, for punishment of offenders, and for the general administrative duties of traffic control.

The proposed traffic ordinance which was also made a part of the report agrees very closely with the proposed model traffic ordinance recently developed by the National Conference on Street and Highway Safety, the principal exceptions being those provided for in the model code to take care of local conditions.

NEW DEVELOPMENTS—Automotive

Flexible Shaft Machines

THE Mall Tool Co., Chicago, has brought out two additions to its line of flexible shaft machines which are so arranged that the motor tips up and down as well as being able to turn about a vertical axis. This new feature permits the use of a lower motor stand and



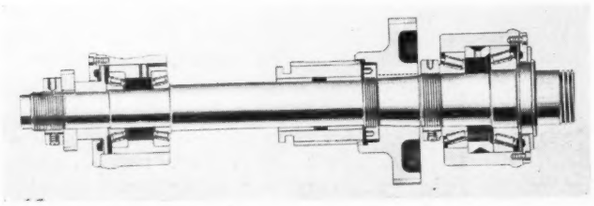
Mall flexible shaft machine with tilting, rotating motor

permits the machine to be brought closer to the work as well as reducing strains on the flexible cable.

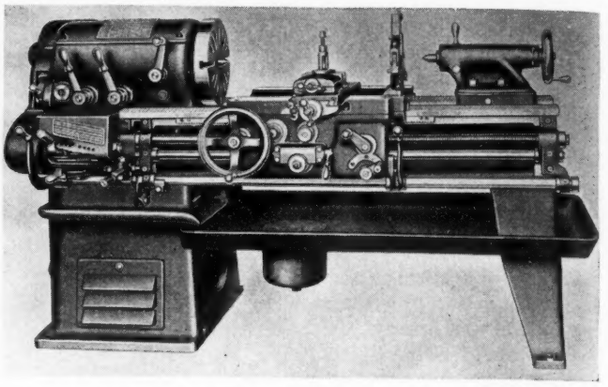
The motor is a ball bearing, 110-volt, 60-cycle a.c. type which runs at 3450 r.p.m. It is rated at ½ hp. with 1¼ hp. available whenever needed. The machine is being made in two styles differing only in the hand spindles. Model No. 2426 is fitted with a ball bearing angle hand spindle while No. 2526 has a straight hand spindle.

Reed-Prentice Lathe

REED-PRENTICE CORP., Worcester, Mass., has developed a new model 14 and 16 in. sliding gear head engine lathe. The gears in the sliding gear transmission are of nickel chromium steel with the



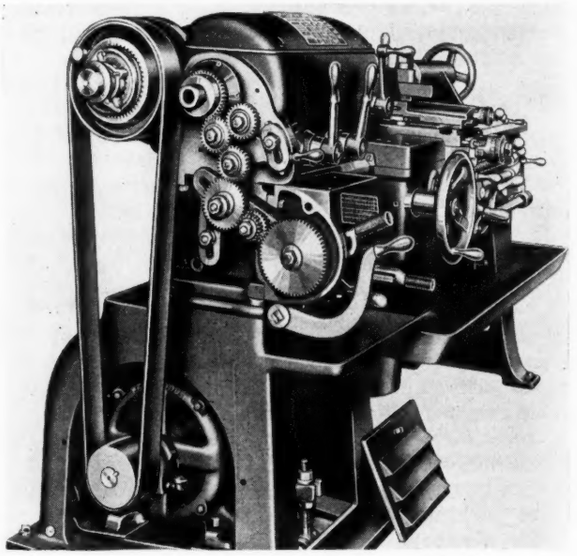
Spindle construction in new Reed-Prentice lathe



General view Reed-Prentice sliding gear head engine lathe

gear teeth cut on Fellows gear shapers, burnished before and lapped after hardening. Back shafts are of heat treated steel and run on ball bearings. Eight spindle speeds are provided through nine gears, changes being made by means of three levers at front of head. All gears run in an oil bath.

The heat treated nickel chromium alloy steel spindle runs in a four-bearing precision Timken mounting with thrust taken through the front bearing. Twin disk clutch and brake provide for instant start and stop of spindle. The quick change gearbox has gears



End view of Reed-Prentice lathe

of high manganese alloy steel and provides 41 changes of feeds and threads. End gearing provides for compounding and special pitches.

The apron is a one-piece casting with all studs bronze-bushed. Gears are 0.45 to 0.50 carbon steel. The double disk clutch for cross and longitudinal feeds is operated by a single lever. A central oil reservoir is provided. The cross feed screw is heat treated chrome vanadium steel with phosphor bronze nut and a two-way ball thrust bearing. The leadscrew is mounted on radial ball bearings and the tailstock is of the two-bolt type with improved spin-

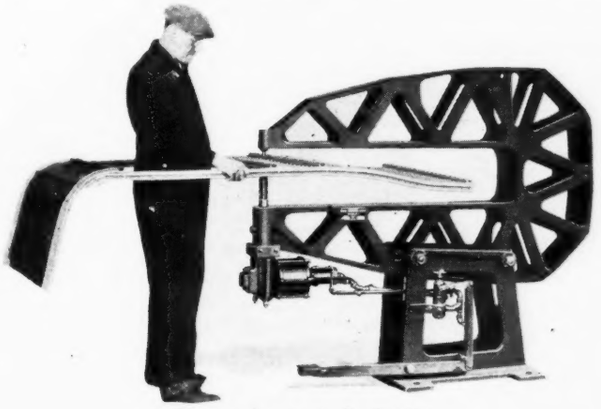
Parts, Accessories and Production Tools

dle binder. The motor is mounted in the head end. Either chain or belt drive is available.

The eight speeds range in geometrical progression from 18 to 432. The 41 feeds range from 0.0035 to 0.112 in. per rev. The 41 thread changes range from 3 to 96 threads per in. The swing over the bed is 14½ for the small size and 16½ in. for the large size. Swing over compound rest is 9 and 11 in. With a six-foot bed either lathe admits 31½ in. between centers.

Hanna Riveter

THE Hanna Engineering Works has developed a new riveter designed particularly for use in connection with duralumin rivets as employed in air-



Hanna long reach riveter

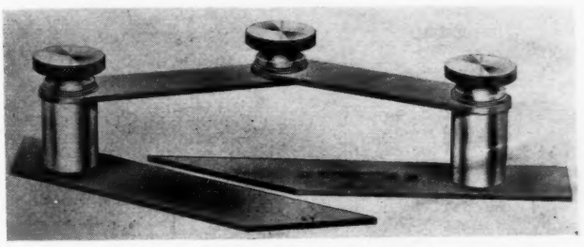
craft and motor coach construction. This new model has a reach of 48-in., a 10-in. gap, die stroke of 1½ in. and when operated at 100 lb. air pressure is capable of driving ¼ in. diameter duralumin rivets.

Maximum ram speed is 60 strokes per minute. The pressure exerted is predetermined and is uniform for a considerable portion of the stroke. With the machine arranged as shown in the accompanying illustration the rivets are headed on the underside. The riveter is operated by a foot actuated valve, thus leaving the operator's hands free to handle the work.

Two New B. & S. Products

BROWN & SHARPE MFG. CO. has announced two new products, a line of spiral shell end mills and a combination bevel. The line of end mills is stocked in 14 sizes, in diameters from 1¼ to 6 in. Arbors can be furnished to accommodate these cutters for use on Brown & Sharpe milling machines having threaded or tapered nose spindles and on all milling machines having standardized spindle ends.

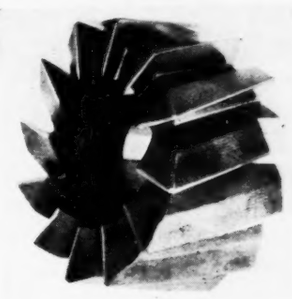
The new combination bevel, No. 502, is provided with two posts to make possible an unobstructed view of any angle at which the blades may be set. These posts give clearance for scribing or drawing lines



New Brown & Sharpe combination bevel

the full length of the blade and also make possible their use on alternate sides of a projection up to ⅞ in. high.

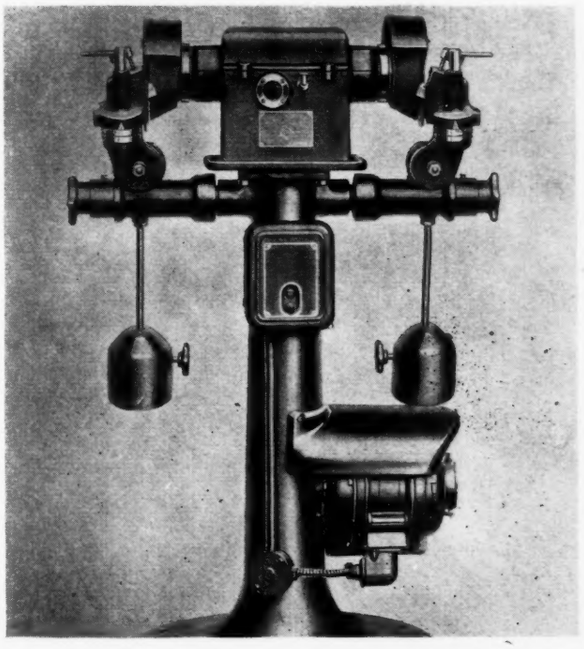
The back of the tool is flat and the tool can be laid directly on the work. The clamp nuts are designed so that the blades can move freely without looseness or can be locked securely. The blades are of steel and are ground on all sides as well as on the ends to angles of 30, 45, 60 and 90 degrees.



Typical item in the new Brown & Sharpe line of spiral shell end mills

Gleason Tool Grinder

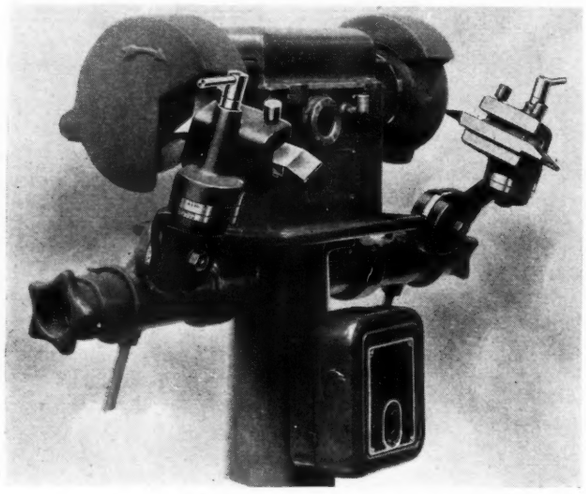
A NEW generator tool grinder, designed to grind the tools used on any of the Gleason straight bevel gear generators or the 60 in. spiral bevel gear planing generator, has been brought out by Gleason Works, Rochester. The machine is equipped with two



General view of new Gleason tool grinder

grinding wheels, one for grinding the upper tools and the other for grinding the lower tools.

Tools can be ground to any side rake angle and to any front rake by adjusting the tool holder through



Detail of tool holders showing graduated collars for rake adjustment

graduated collars. The work is pushed across the wheel by hand and is fed in by a hand nut on the end of the shaft on which work and holders are mounted.

The grinding wheel spindle runs in oil on precision ball bearings. Three different pairs of tool holders are available—one for the 60 in. spiral bevel generator, one for the 25 in. bevel gear generator and a third for the 6, 11 and 18-in. bevel gear generators, the 8-in. manufacturing bevel gear generator and the 12 in. bevel gear generator tools. Only one set of tool holders is furnished as standard equipment.

Norton Grinder

SIMPLICITY of construction and complete power control feature an improved 12 by 36-in. universal multi-purpose grinding machine developed by the Norton Co., Worcester, Mass. It is designed as intermediary equipment between the tool grinder and heavy production machines and includes in its range of work external, internal and face grinding.

The new machine is self-contained with three separately controlled motors driving the headstock, the wheel and the work table and pump. Complicated gearing and shafting are eliminated by the use of the three motors.

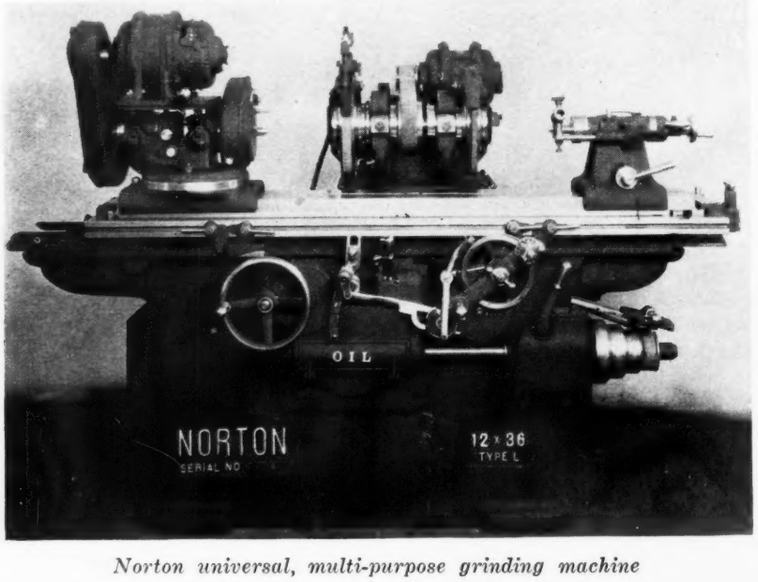
The machine is rigidly built and will swing work up to 14 in. diameter or grind pieces 37 in. long. A wide variety of pieces can be ground.

The headstock and wheel head are swivel type and are graduated in degrees at their bases. Positions on the headstock are provided for face grinding. The wheel head may be swiveled through 180 deg. to bring the internal grinding spindle into position. Intermediate positions for angular grinding are also provided.

The headstock has a chuck which may be attached to the spindle to handle work too small to place on centers. The center may be made live or dead for plain cylindrical grinding.

The footstock is a combination lever and screw type for quick changing of work on centers. A diamond tool holder is provided. The work table is made in two parts, is graduated in degrees for taper grinding and also in feet per minute.

Eight speeds, ranging from 21 to 111 in. per min., are available. The wheel feed, either hand or automatic, operates at any position of the work slide. An automatic stop arrests the feed when the work is to size.



Norton universal, multi-purpose grinding machine

New Idea in Tire Gages

A NEW development of the U. S. Gage Co., 44 Beaver St., New York, is a line of dial-type balloon tire pressure gages specially adapted for specific makes of cars. The gages are calibrated for pressures from 1 to 50 lb. Gages for each make of car have the name of the car in large letters across the face of the dial, together with the recommended tire pressures for all chassis models in the line. The gages are inclosed in durable nickel cases with a release button on the side which is pressed to return the indicator hand to zero.

The first of the new gages to be placed on the market will be for Buick, Nash, Marmon, Studebaker, Willys-Overland, Willys-Knight, Hudson-Essex, Dodge and Reo-Wolverine owners.

Removal of Fumes

A NEW type of exhaust system for removing injurious fumes from plating operations has been developed by the Cleveland Blow Pipe & Mfg. Co., Cleveland. A sheet metal duct surrounds the top of the tank. Around the side facing the liquid a narrow slot is cut. A certain volume of air is drawn through this slot at a high velocity, depending upon the size of the tank, and the suction blanket so formed prevents any of the fumes from entering the room.

The operator is thus protected from the fumes, but, since there are no overhead hoods, the work is unobstructed. The amount of power required to run the exhaust fan is small. This system is particularly adaptable to chromium plating tanks.

Development *in* Motor Bus Design Brings Complex *Problems*

Great increase in size of engines makes it difficult to keep radiator low enough for driver to see over, while finding space for fuel tanks under floor is real puzzle.

DESPITE many changes in the interest of comfort, speed and efficiency, development work is still being earnestly pursued in the design of bus chassis, it appeared from a paper presented to the Metropolitan Section of the Society of Automotive Engineers on May 17 by George W. Smith, Jr., works manager of the White Co.

The bus, he said, has grown from a vehicle of less than 5 tons weight with complete passenger load, to one of over 10 tons; its overall length has increased from less than 20 ft. to a maximum of 38 ft. although in most states legal restrictions limit this dimension to 30 ft. The front axle tread has increased from 56 to 78 in., while the height of the chassis frame above the ground has decreased from more than 30 to slightly over 20 in.

Wheelbase and Tires

Tire equipment has run through the whole gamut of solid and pneumatic tires, the latter in the fabric, cord and balloon types. The old 36 by 4½ in. tire, with a carrying capacity of 1250 lb., has given way to the present-day 10.5 in. balloon tire, with a carrying capacity of 5500 lb. At the beginning of the century the wheelbase was around 160 in., but by 1921 it has been increased to 200 in. and at the present time it is near 240 in.

In the practice of the White Co., engine displacement has increased approximately 60 per cent, while engine power has increased 125 per cent. Generator output has increased from a little less than 200 watts to a full kilowatt (1000 watts). Engines now are furnished with an air compressor, the capacity of which has been jumped recently from 3 to 6 cu. ft.

The increase in the electrical load is astonishing. The increased amount of electric current is required for the following purposes: The usual starting and lighting; extra marker lights and destination lights; on interurban buses, a rear circular marker with the company's name is illuminated to vie in brilliancy with the markers on the rear of our crack trains; brilliant illumination for the interior of the buses; electric fans, electric windshield wipers, and electric gasoline pumps. As regards cash boxes, both electric and air-operated types are used.

Radiator frontal area has increased from 450 to 650 sq. in., or nearly 50 per cent. In fact, with engines getting still larger and with the radiators as wide as practical, they are becoming so high that it is difficult to see over them. The problem becomes acute with engines of over 500 cu. in. displacement. With gas-electric drive the demands on the radiator become still greater, because of the increased engine power required to make up for the greater transmission losses.

Passing now to the running gear, frame sections have increased in depth from less than 6 to more than 11 in., the section modulus having increased some 350 per cent. Widths of buses have increased to 96 in., this being the limit set by legal regulations. With this legal limit of 96 in. and with rear dual balloon tires, the combined width of which is more than a yard, the chassis designer, after making the necessary allowance for clearance between tires and chassis frame, takes the space left to him for frame width.

Brakes are now applied to all four wheels and are of two generic types, one lined with a friction material having high heat conductivity (the metal-to-metal type) and the other with friction material with low heat conductivity (the familiar woven and molded asbestos linings). A variety of methods are employed for brake operation. We have first of all the self-energizing form of brake; then, the vacuum servo and, finally, the compressed air brake.

With power braking there is a possibility of abuse of both brakes and tires, and, generally speaking, so far operators have failed to control such abuses. Mr. Smith gave it as his opinion that the metal-to-metal brake is superior wherever the requirements are exceptionally severe, as in service in mountainous districts. However, metal-to-metal brakes will not sweep the field, because conditions are not always equally severe, and under some conditions cheaper forms of brake are economically advisable. The advantage of the highly conducting type of friction lining over the less-conducting type is the greater ability of the former to get rid of the heat of friction, in additon to which the brake travel and the amount of clearance are not materially different when the brake is hot and when it is cold.

Space for Fuel Limited

A serious problem in modern bus chassis design is to find room for the gasoline tank. Placing it inside the body is prohibited by law, and with the body floor only 21 in. above ground, it is a real engineering problem to find the necessary space for a 19-gal. tank (approximately 12 cu. ft.).

The rear axle shaft constitutes a most interesting example of evolution, the section modulus having been increased 600 per cent, in many painful steps, while at the same time the axle bearings were moved out close to the center of wheel load. The reason for this was that at the start the normal rating (passenger load) meant nothing to the operator. As regards performance, the early buses were tested at maximum speeds of 50-55 m.p.h., while today the White Motor Company's buses are tested at speeds of more than 75 m.p.h., which with a gear ratio nearly 6 to 1 means 4000 engine r.p.m.

AUTOMOTIVE NEWS SECTION INDUSTRIES

Philadelphia, Pennsylvania

June 2, 1928

June Operations to Hold at High Seasonal Level

PHILADELPHIA, June 2—Production of automobiles in May will show only slight decline from the high production totals of the two previous months, increasing output of Ford cars largely making up for reductions by other makers. The same general condition will govern the automotive manufacturing situation in June, most plants reducing output with the closing of the quarter and Ford increasing to meet the heavy accumulated demand built up during the past year.

Parts and material plants supplying car manufacturers will continue to operate on fair schedules during June, demand being sustained by the increased buying by Ford from outside sources, and by preparations of some other manufacturers for summer presentations of new cars. With the removal of the excise tax on cars now at hand some expansion of buying is expected to be evidenced.

Though retail sales in May have been generally satisfactory they have not been large enough to overcome the heavy shipments from factories in March and April and as a result dealers will carry fairly high stocks of

(Continued on page 860)

Meyer's Miller Wins Indianapolis Race

INDIANAPOLIS, May 31—Louis Meyer, driving his first major race, won the 500-mile race here yesterday in a Miller Special, finishing in 5:01:35 at an average speed of 99.482 m.p.h. Second place went to Lou Moore in another Miller Special who finished in 5:02:17. George Souders, last year's winner, was third in an S. A. I. Special, and Ray Keech, holder of the world's speed title, was fourth in an S. P. R. Special, finishing in 5:21:28.

Meyer's average set a new track record for engines of 91 cu. in. piston displacement. Last year's time was 97.45. The car used by Meyer was an old timer, finishing third in the race last year when driven by Gulotta. The only accidents of the race were crashes into the retaining wall by Earl Devore and Benny Shoaf, both of whom escaped serious injury.

Willys Ships 2951 in Day

TOLEDO, May 28—Willys-Overland set two new car shipment records and a new driveaway record during the week ending May 26, company officials said here today. On May 25, shipments of Willys-Knight sixes and Whippet fours and sixes totaled 2951, the largest one-day shipment record in 20 years. The highest previous record was 2047 cars on April 26.

$10,500,000 Refund Winds Up Car Tax

WASHINGTON, May 29—The 3 per cent automotive excise tax was officially eliminated at eight o'clock, Eastern standard time, today, when President Coolidge affixed his signature to H.R. 1, known as the tax reduction bill. Elimination of the tax will save the automobile purchasers this year approximately $66,000,000.

In order to expedite the refunds, the Treasury Department on May 25 notified all collectors to extend the time for filing returns for April and May to July 31. This was done in order to enable the manufacturers to accumulate a reserve out of which they could in turn refund to the dealers the floor tax.

The procedure that 52,000 dealers must follow to obtain this refund is as follows: They must prepare an inventory of all cars on hand as of 8 a. m. May 29. This inventory is to be checked by the Internal Revenue Department and then forwarded by each dealer to his manufacturer. The manufacturer, under law, is then authorized to make the refund to the dealer. It is estimated that approximately $10,500,000 will be refunded by the manufacturers to the dealers.

Moon Prices Cut in N. Y.

NEW YORK, May 28—The Moon-Diana Sales Corp. of New York is offering 1928 Moon Royal models at reductions of $300, the custom-built sedan being priced at $1,297; the four-door sedan at $1,197; the cabriolet roadster at $1,197, and the roadster at $1,097. The prices are delivered prices in New York and include full equipment.

Rawson Named Sales Manager

ST. LOUIS, May 31—R. A. Rawson, assistant sales manager of Moon Motor Car Co., has been appointed general sales manager. In 1926 he was made general sales manager of the Elcar Co. and in November, 1927, came to the Moon company.

Coolidge Signs Bill For 1930-31 Highways

WASHINGTON, May 26—The Senate Bill 2327, authorizing $165,000,000 for Federal Aid in the state construction of highways for the year 1930 and 1931 was signed by President Coolidge today, thus assuring for the next two years the continuation of the Federal Aid highway program. The law authorizes appropriations of $75,000,000 for post-roads during the fiscal year ending June 30, 1930, and $75,000,000 for use during the fiscal year ending June 30, 1931. An additional sum of $7,500,000 is provided for each of these years for construction of forest roads and trails.

Bank Buys Italia Plant, Will Form New Company

WASHINGTON, May 31—The sale of the Italia automobile plant, at Turin, Italy, is reported to the automotive division of the Department of Commerce. The plant has been purchased at a private sale by Umberto Paolini, one of the directors of the Banca Nazionale di Credito and Dante Ferraris, a former minister of commerce. The purchase price was given as being Lira 35,000,000. The maximum capacity of the factory is 1000 cars per year, its 1927 production being 500 cars. The department is advised that a new company is being formed and an expansion program mapped out involving the building up of a sales organization.

Increase in Belgian Sales

WASHINGTON, May 31—American sales of automobiles in Belgium the first four months of the current year are represented as exceeding the total 1927 business, according to a report to the automotive division of the Department of Commerce. American sales are estimated to be 50 per cent of the total compared with 32 per cent during the entire year of 1927.

Durant Adds Sport Model

NEW YORK, May 28—Durant Motors, Inc., is offering a sport roadster on its four-cylinder chassis at $595 f.o.b. Lansing. This car is available in ebony black set off with orange beading, in desert sand and in canary yellow. Each car is equipped with natural wood wheels, windshield wings, and neatly trimmed rumble seat. Tops are finished in Burbank material.

Chrysler and Dodge Brothers Unite to Form Third Largest Producer

Each Company Will Retain Physical Identity in New $500,000,000 Combination—Chrysler Chairman, Dillon Heads Finance Committee

NEW YORK, May 31—Chrysler Corp. and Dodge Brothers, Inc., have been brought together in a merger which apparently caught the financial district and probably the greatest part of the automotive industry by surprise. Under terms of the deal the Chrysler Corp. purchases outright Dodge Brothers on an exchange of stock basis. The new company will have a capitalization of from $350,000,000 to $500,000,000.

The merger, as it now stands, brings together two organizations manufacturing products in price classes almost directly competitive. In this it has departed from the type of merger which has been largely discussed in the industry in the past several years. These phantom mergers have been concerned always with a selection of companies, strong or otherwise, whose products fell in separate price groups.

The merger now consummated brings together two of the strongest companies in the industry, Chrysler last year ranking third to Chevrolet and Buick in the value of its product, and Dodge Brothers falling back slightly after holding third position among individual car manufacturers for more than a decade. As a joint producer the company will rank third to General Motors and Ford on the basis of indicated production this year.

The merger will be accomplished by an exchange of stock on the following basis:

One share of Chrysler common for one share of Dodge preferred stock.

One share of Chrysler common for five shares of Dodge Class A stock.

One share of Chrysler common for ten shares of Dodge Class B stock.

The Chrysler Corp. will assume the outstanding liabilities of Dodge Brothers, including $57,276,000 of debenture bonds.

Each to Retain Identity

A new organization will be formed with 4,423,484 shares of no par capital stock. The new company will have a funded debt consisting of $57,276,000 of debenture bonds and $2,750,000 of notes which were issued in connection with the acquisition of the Graham Brothers Truck Co. Neither company will lose its physical identity.

The plants, distribution forces and other elements of each enterprise will remain separate and independent. Walter P. Chrysler will become chairman of the board and Mr. Dillon will become chairman of the finance committee of the reorganized corporation. E. G. Wilmer, now president of Dodge Brothers, will remain in that capacity, since it was one of Mr. Chrysler's stipulations in connection with the merger that he remain in this capacity in which he has made considerable success in the past two years.

Walter P. Chrysler
Who will be chairman of the board of merged companies

The first step in the amalgamation will be the calling for retirement of the Chrysler Corporation preferred stock. The following statement was issued by Mr. Chrysler in this connection after his directors met yesterday:

"Chrysler Corp. directors, at a special meeting held in New York today, voted to call for retirement on Aug. 6, 1928, the entire issue of the corporation's outstanding 8 per cent preferred stock amounting to 220,937 shares at its call price of $115 per share and accrued dividends to date of retirement, requiring slightly in excess of $25,000,000. By this operation the corporation will be relieved of annual preferred dividend charges of $1,767,496.

"The cash payment of the foregoing amount will be permanently provided by the offer to the common stockholders of the privilege of purchasing at $57.50 per share common stock of the company, authorized but heretofore unissued, at the rate of one-sixth of a

(*Continued on page 857*)

Business in Brief

Written exclusively for* AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co.

NEW YORK, May 31—Rather extensive liquidation in the stock market has followed the advance in the rediscount rate in New York. The downward movement of prices was interrupted last week, but was resumed at the beginning of this week with a general advance in money rates to the highest levels reached in several years.

FEDERAL RESERVE REPORT

The general banking situation continues to be characterized by a decline in reserves and by decreased holdings of open market purchases and Government securities by the Federal Reserve banks, the latter being approximately offset by an increase in rediscounting by member banks. Loans and discounts of reporting member banks declined $86,000,000 during the week ended May 23.

GENERAL TRADE

Trade has improved to some extent with warmer weather, although temperatures in many parts of the country are still unseasonably low. Rainfall in the Northwest has benefited the spring wheat crop. The monthly summary of the Federal Reserve Board, covering business conditions in April, reports that the volume of industrial production continued large, reflecting chiefly increased output in metal industries. Wholesale trade was extremely irregular, hardware sales showing the largest year's increase in nearly three years and drug sales also gaining unusually sharply.

FREIGHT CAR LOADINGS

Railway freight loadings reached the million-car mark for the first time this year during the week ended May 12. The total, however, remained below that of last year, amounting to 1,001,983 cars, as against 1,029,424 cars a year ago and 1,029,748 cars two years ago.

BANK DEBITS

On the other hand, the volume of payments by check, as measured by bank debits to individual accounts outside of New York City, during the week ended May 23 was 14 per cent larger than in the corresponding period last year.

FISHER'S INDEX

The first marked decline in commodity prices since early in April occurred last week. Professor Fisher's index stands at 98.8, which compares with 99.6 a week ago and 99.7 four weeks ago.

PETROLEUM OUTPUT

There was a further decline in crude petroleum production during the week ended May 19, average daily output amounting to 2,339,000 barrels, as compared with 2,355,400 barrels in the preceding week, 2,466,650 barrels a fortnight earlier and 2,478,000 barrels in the like period of 1927.

See Sales Continuing High Through June

Production During Month Expected to Exceed 1927 Totals Car Stocks Normal

DETROIT, May 28—While the automotive industry appears to have passed the peak production point for the year, indications are that business will remain at a high level throughout June with a result that production of motor cars should continue considerably higher than during the corresponding period of a year ago.

In face of the exceptional business the industry has enjoyed throughout the spring months it is still reasonable to assume that the production trend will follow well defined lines of other years. This means that output will start to gradually decline though close students of the situation believe there is every reason to assume that the general trend will be well above the figure of a year ago.

Demand for motor cars appears to be pretty evenly distributed throughout the country. In other words there is no serious spotted condition existing such as has characterized some previous seasons. Various lines of endeavor seem to be in somewhat prosperous condition and this, coupled with record prices for stocks in Wall Street, has given the buying public as a whole confidence in purchasing motor cars.

Reports from various manufacturers indicate that new car stocks in dealers hands, or in transit, are normal. Some companies which have been enjoying unusual sales report that new car stocks are far below normal and that their factories are being hard pressed to meet the demand for retail orders.

Lansing Salvage Expands

DETROIT, May 26—The Auto Salvage Co., of Lansing, has leased additional land from railroad companies to enlarge its yard. The company was organized a year ago by a number of Lansing automobile dealers for the purpose of salvaging automobiles and has proven such a success that an expansion of activities has been deemed advisable. Besides additional yard space a new parts warehouse has been built.

Hupp Appoints Distributor

DETROIT, June 1—Appointment of a new distributor at Boston to supersede Jeffery-Nichols & Co., was announced today by Hupp Motor Car Corp. The new company will be known as the Boston Hupmobile Co. and its territory will cover Rhode Island and Massachusetts, with the exception of Berkshire county. Officers of the new company will be J. H. Johnson, president, and Eric Courtney, vice-president. They are well known in Boston automotive circles, having operated for a number of years as the Boston Buick Co.

Port of New York Plans R.R. Terminal

NEW YORK, May 28—The Port of New York Authority is planning the operation of an inland freight terminal for the joint use of all railroads of the port. Under the plan the terminal would be used for concentrating freight for all railroads with distribution according to the desires of the shipper. By its use it is expected to facilitate shipment and receipt of goods, eliminate unnecesary trucking and lessen street congestion and congestion at the present water front terminals.

Midland Steel to Spend $600,000 for New Units

CLEVELAND, May 28 — Midland Steel Products is launching a $600,000 expansion program which will provide increased facilities for frame and brake production. The company will increase the manufacturing space of the Detroit plant 41,000 sq. ft. and is acquiring property adjoining the Detroit plant for the contemplated erection of a building to take care of increased brake demand.

The company reports net profit of $302,745 in April as against $256,909 in April last year. For four months profit totaled $933,296 before Federal taxes, against $859,957 in the same period last year.

Durant Gains on Coast

PORTLAND, ORE., May 28—Reports from the Pacific Northwest States indicate a big increase in Durant-Star sales, and a number of sales records have been broken. This line now occupies third place in Oregon; second in sales in Utah, with 86 per cent gain; 50 per cent gain in Washington sales; 68 per cent in California sales.

Chevrolet Passes 500,000

DETROIT, May 26—According to H. J. Klingler, general sales manager of Chevrolet Motor Co., more than 500,000 of the new 1928 Chevrolets were on the road by the end of the fourth week in May. It is claimed that this establishes a record high figure for the public acceptance of a new model. It is also more than 100,000 units in excess of the corresponding performance of the company in 1927, he said.

Triplex Increases Ford Shipments

DETROIT, May 26—The Triplex Safety Glass Co. of North America, is reported shipping 1000 glass windshields daily to Ford Motor Co., which is 50 per cent of its requirements. The production program of Triplex for the current year calls for an output sufficient to equip 1,000,000 automobiles.

Rickenbacker Finds Sales Outlook Good

Country Generally Prosperous With South and West Showing Most Progress

DETROIT, May 28—Prosperous conditions throughout the United States as a whole are reported by Capt. E. V. Rickenbacker, who has just returned to Detroit from a tour of 102 cities throughout the country. He finds marked signs of progress in the section south of the Mason and Dixon line and east of the Mississippi, with the state of North Carolina a particularly bright spot and with Florida on the eve of new developments. While he finds the low economic point of the country in the Mississippi valley, he forecasts extensive developments as soon as legislation for flood control becomes effective.

Mr. Rickenbacker, who is assistant general sales manager of the Cadillac Motor Car Co. in charge of La Salle sales, made his tour to confer with Cadillac-La Salle distributors. The prosperity which he finds general throughout the country he believes is based upon improved facilities of every kind for transportation and communication.

"I believe the southeastern section of the country will show a distinctly outstanding percentage of improvement during the next 10 years," Mr. Rickenbacker said. "Much of this will be traceable to the building of improved highways, following the lead of California and many other sections of the country. "The state of North Carolina is an outstanding demonstration of what effect improved highways have upon general economic conditions. Those in charge of the destinies of that state have seen fit to bond the state for the building of public schools and wide, paved highways, knowing that the two will bring an influx of population which will pay for the improvements. As in many of the Southern States, here millions of Northern capital are being invested in textile mills and other forms of manufacture and there has been a big development of hydro-electric power."

Philadelphia Sales Gain

PHILADELPHIA, May 26—Sales of new cars to dealers by 12 distributors increased during April both in number and value as compared with a month and a year before. Retail sales also increased in the month and were substantially larger than in April, 1927. Business in used cars, while declining materially from March to April, exceeded the volume of a year earlier. Stocks of new cars declined from those at the end of the previous month, but were much larger than those on the same date last year. Supplies of used cars increased slightly in the month and were materially larger than a year earlier.

Coast Jobbers Deal Lowers Sales Costs

Combination of Effort and Reduction of Stores to Effect Economies

SAN FRANCISCO, May 28—Details of the largest combination of automotive merchandising interests ever effected on the Pacific Coast were given today by G. H. Scovel, vice-president and general manager of the Waterhouse, Lester, Scovel Co., a prominent figure in the merger.

The merger includes Weinstock, Nichols & Co., the Triangle Parts Co., and the Waterhouse, Lester, Scovel Co., all of San Francisco, three of the largest automotive parts wholesalers west of the Mississippi. It has been some three months in the making, and the result is one of the largest, if not the largest, automotive parts and equipment corporation in the United States.

A name has not been chosen for the merged corporation, and will not be until June 1.

Capitalization will be $2,000,000, composed of the present capital stocks of the companies involved. All the stock is paid in, and there will be no stock for sale. The deal involves largely the exchange of stock certificates among the participants, and no additional capital will be required or sought.

The Weinstock, Nichols & Co. store in San Francisco will be discontinued, according to Mr. Scovel, as will also the Triangle Parts Co. store, in Oakland, across the bay. This will leave the Waterhouse, Lester, Scovel Co. plant and the Triangle Parts Co. store functioning for the merger in San Francisco, with the Waterhouse, Lester, Scovel store in Oakland. Three Triangle parts branches in other cities will be continued as outposts of the merger.

To Employ 39 Salesmen

The new combination covers central and northern California, Nevada and southern Oregon. To a large extent, according to Mr. Scovel, the personnel of the companies absorbed in the merger will be retained, but the sales force will be increased to 39 men, who will be constantly on the road, the largest force of salesmen employed by any automotive merchandising corporation in the West.

"The consolidation," he continued, "accomplishes first of all a definite economic result in the automotive parts merchandising industry in this section, in that it eliminates duplication of effort, and, by increasing the facilities available to handle the present volume of business, will expedite that business and inevitably increase the volume. It will spread over a very much larger volume of business the costs of administration, merchandising, distribution and overhead. It will result in a constant, equable, certain, source of supply throughout the territory."

Shaler Inaugurates Vulcanizing School

MILWAUKEE, May 28—The Shaler Co. has started a vulcanizing school at its Waupun factory where users and prospective users of Shaler vulcanizers are given a training course under factory department heads. The course is given without cost and schedules are arranged in the order that applications are received. Lectures by accredited engineers explain the principles of modern balloon tire construction and why balloon tire repairing is a science instead of a mere job. In addition to the repair course, the school instructs in the best methods of selling tire service.

French Demonstration Run to Use Substitute Fuels

PARIS, May 15 *(by mail)*—Seeking to develop the use of substitutes for foreign gasoline, the Automobile Clubs of France and Belgium will organize a national fuel demonstration in the north and northeast of France from July 9 to 30. The event is not considered as a competition, but merely as a demonstration of the possibilities of using such substitutes as wood, coal, alcohol, illuminating gas, synthetic gasolines, etc., in internal combustion engines.

Starting from Paris, the competitors will spend 16 days on the road, the most important towns touched being Soissons, Rheims, Brussels, Liege, Metz, Strasbourg, Nancy, and Chalons. Entries already received are a Peugeot Diesel, and Renault and Panhard & Levassor producer gas engines.

Celoron Increases Capacity

PHILADELPHIA, May 28—The Celoron Co. of Bridgeport, Pa., is completing a new building which will provide 19,800 ft. of additional floor space. When fully occupied the new building will give the company capacity for 4,000,000 timing gears annually. Production is now running at about 8000 cam gear blanks daily. The gears are now standard on Ford, Chevrolet and Studebaker.

Coast Tire Sales Gain

SAN FRANCISCO, May 28—Tire sales are improving throughout the country and especially on the Pacific Coast, according to Howard Smith, general sales manager of the General Tire & Rubber Co., who spent the last week in May on tour of Pacific Coast distributors. "In spite of the late spring," said Mr. Smith, "the tire business throughout the country is bright, especially so on the Pacific Coast."

Standard to Extract Fuel Experimentally

With German Company Will Establish Station to Continue Coal Tests

NEW YORK, May 28—Standard Oil Co. of New Jersey and the I. G. Farben Industrie of Germany are preparing to establish a joint experimental station in the United States this summer for the production of gasoline from coal. This will be for the completion of preliminary work which has been going on for some time in Germany but will not be intended for commercial production except at some distant date. The site of the station probably will be in Louisiana where Standard Oil has large interests and facilities are available to expedite the test work.

Walter C. Teagle, president of the Standard of New Jersey, is expected to visit Germany this summer and confer further with officials of I. G. Farben Industrie concerning the utilization of the process for extracting gasoline from coal. He arranged with this organization when he was in Europe last summer to have his company use the process in this country. In return, the Standard of New Jersey will give I. G. Farben Industrie the right to use some of its processes in the European markets.

Mr. Teagle made it clear when he returned from Europe last summer that his company had no intention of producing gasoline from coal in this country on a commercial scale in the near future. With the present large overproduction of petroleum, there is no need for the new process and probably will not be for some years. Under present conditions gasoline cannot be produced from coal as cheaply as from crude petroleum and as long as this condition continues no use will be made of the new process. The German organization and the Standard of New Jersey are proceeding with the development of the process, however, on the theory that ultimately it may be useful.

Carl Bosch, president of I. G. Farben Industrie, told stockholders at the company's annual meeting in Frankfurt-on-Main that the successful production of gasoline from coal was assured. He said, according to dispatches from that city, that the company's production of gasoline from coal would amount to 100,000 tons this year and predicted that the 1929 output would run as high as 200,000 tons. He also told his stockholders, according to the dispatches, that I. G. Farben Industrie was studying the possibilities of synthetic production of lubricating oils.

Whippet Six Roadster $685

TOLEDO, May 28—The price on the Whippet Six roadster has been increased from $615 to $685, according to factory announcement.

Men of the Industry and What They Are Doing

Mooney Back from Europe; Other Executives Arrive

J. D. Mooney, president of General Motors Export Co., who has been in Europe for the past six weeks, returned to New York May 29. C. T. Coleman, manager of the bus and truck division of General Motors Export Co., is sailing for Berlin June 2. He will visit the plants in Europe in the interest of bus and truck development. A. M. Selby, sales manager of the Sydney branch General Motors Australia, Pty. Ltd., arrived May 28 for a short visit to the home office. A. F. Bassett, managing director of General Motors Brazil, arrived in New York May 30 for a visit to the home office and to the factories. W. M. Williams, treasurer of General Motors Brazil, arrived in New York May 30 for a short visit to the home office and for a vacation. He is accompanied by his family.

Preble Joins Brockway

Martin A. O'Mara, president of Brockway Motor Truck Corp., manufacturer of Brockway and Indiana trucks, has announced the appointment of T. L. Preble as assistant general manager. Mr. Preble was a member of the White Co. staff for the last eight years, supervising for the previous five years, as regional service manager, the Eastern branches of the company. His duties also required active participation in the coordination of sales, service, production and engineering activities with the management at Cleveland.

Kirk Entertainment Chairman

J. N. Kirk, sales manager of the World Bestos Corp., has been placed in charge of entertainment for the banquet to be held during the National Standard Parts Association show and convention in Cleveland in October. Mr. Kirk has been prominently identified with amateur boxing in the East since 1904 and has been chairman of the New York Athletic Club Boxing Committee for 10 years. He has refereed and judged more than 300 bouts this year.

Chalfant Speaks in Chicago

E. P. Chalfant, executive vice-president of the National Standard Parts Association, spoke at the regular monthly meeting of the Chicago division. The meeting was attended by more than 80 parts manufacturers and jobbers. L. C. Smith, president of the Chicago group, presided.

Snow and Barnes at Tests

H. C. Snow, chief engineer, and William Barnes, chief experimental engineer of Auburn Automobile Co., are in Atlantic City supervising experimental tests being made by Wade Morton, with various Auburn models.

N.A.C.C. Entertains Visiting Notables

Among the notables recently visiting the National Automobile Chamber of Commerce were Fred S. Mann of the Chamber of Motor Industries of South Australia, and Alberto Pirelli of Milan, president of the International Chamber of Commerce, who with Dr. William Scholz, general manager of the Associated Automobile Manufacturers of Germany, made a comprehensive study of methods employed in this country.

Gillette Joins Thompson

Leslie S. Gillette has joined the J. Walter Thompson Co. Mr. Gillette is widely known in automobile circles, having been identified with the Detroit and New York offices of the Chilton Class Journal Co. Mr. Gillette has had close contact with advertising and merchandising problems of the dealers and distributors of several well-known automobile manufacturers.

Allen Speaks in St. Louis

Twelve General Motors divisions were represented at a meeting of officials, employees and their families at which Floyd A. Allen, personal representative of President Alfred P. Sloan, spoke. About 1700 persons attended and were entertained by a showing of the movie "General Motors Around the World."

Tullar G.E. Patents Head

Appointment of Charles E. Tullar as manager of the patent department of the General Electric Co. has been announced by A. G. Davis, vice-president. Mr. Tullar, who has been assistant manager of the department since Dec. 27, 1927, succeeds A. D. Lunt, deceased.

DeBerry Addresses Dealers

P. C. DeBerry, general sales promotion manager of the Olds Motor Works, and other Olds officials, addressed a meeting of 140 Oldsmobile dealers and their salesmen at Hotel Coronado, St. Louis.

Pierce Builds New Governor

ANDERSON, IND., May 29—Pierce Governor Co. announces production of a new governor designed for use on Model AA Ford trucks. Pierce governors are now in use on Fordson tractors, and the company reports steadily increasing demand for these types.

Crowder Vice-President of Motor Dealers Credit

L. S. Crowder, former president of the National Retail Credit Association, has been appointed executive vice-president of Motor Dealers Credit Corp., handling time-payments on Studebaker cars. Mr. Crowder has had more than 25 years' experience in credits, collections, finance and management in mercantile lines and has traveled extensively in this country, Mexico and Cuba in connection with his work. For the past nine years he has been with Mandell Brothers, Chicago department store, as general credit manager, office manager, assistant to the chairman of the board, and assistant treasurer in charge of finances. Mr. Crowder devoted much time to the organization of credit men's associations throughout the country during his association with the National Retail Credit organization.

Loebl Joins Waukesha

H. J. Loebl, for a number of years in the service department of Sterling Motor Truck Co., has been appointed assistant in the service department of the Waukesha Motor Co. W. C. Keifer who has been connected with automotive service for a number of years with Buda, is in charge of field service activities for Waukesha.

Dwinell Branch Manager

C. Irving Dwinell has been appointed manager of the Boston branch of the United States Electrical Tool Co.

N.A.C.C. Meetings in June

NEW YORK, May 28—The truck division of the National Automobile Chamber of Commerce will meet Thursday afternoon, June 7, following the general members' meeting held the same day in the morning. William Nelson Taft, editor of the *Retail Ledger* of Philadelphia, will address the truck members on retail conditions and their effect upon deliveries. The truck committee of the N.A.C.C. will meet on Wednesday afternoon preceding the general members' meeting.

M. & A.M.A. Adds Group

NEW YORK, May 28—The Motor & Accessory Manufacturers Association last week organized its ninth credit group among manufacturers selling through jobbers in the Chicago district. Twenty-two members of the M. & A.M.A. joined this credit group which was organized by Arthur H. Fagan, manager of the credit department of the M. & A.M.A. John E. Williams, of the New York office of the association, was also present and assisted in the organization.

Chrysler Takes Over Dodge Brothers, Inc.

Two Companies to Retain Individual Organizations and Work Cooperatively

(Continued from page 853)

share of new stock for each share now held. Subscription warrants for this privilege will be issued to stockholders of record June 15, 1928, which warrants will be transferable and must be exercised on or before July 20, 1928.

"The retirement of the Chrysler corporation entire issue of preferred stock leaves the common stock equities free of any prior charges on assets or earnings except for a small charge of about $63,000 per annum on the old Maxwell Motor Corp. 5½ per cent bonds."

Mr. Chrysler also said: "I am particularly pleased to bring under one general management two organizations so similar in their ideals of service to customers and high quality of product. I wish to pay tribute to the thousands of splendid dealers here and abroad representing Chrysler and Dodge products. Dodge dealers can look to the new management to continue the policies which brought the Dodge product to favorable acceptance of the American public and I foresee in this move increased opportunities for all those now associated with Dodge Brothers operations both among the dealers and in the factories."

Mr. Wilmer, president of Dodge Brothers, made the following statement:

"I regard this joining of the talents and efforts of Chrysler and Dodge as one of the most constructive steps in recent years in the automobile industry.

"It is the present purpose to conduct the two businesses as separate manufacturing and selling units, each continuing, with the assistance of the other, to render even greater service to the motor buying public in the manufacture and sale of high quality products of conspicuous value."

No Other Purchases Discussed

The combination of the Dillon-Read-Chrysler-Brady interests represented in this merger is the most interesting development which could have come to the motor industry, since the Morgan interests are dominant in General Motors. Whether or not additional independent units are to be taken in was not discussed by the bankers yesterday.

The inclusion of the Dillon, Read & Co. interests in the merger does not mean that the Brady interests have dropped out. Rather, it means that the financial backing of Mr. Chrysler has been expanded and extended. Approval of large stockholders of Chrysler has been assured. The backing and support of most of the large stockholders of Dodge, among whom are the widows of the Dodge brothers, has also been obtained.

The present Dodge Brothers, Inc., has outstanding 850,000 shares of $7 cumulative preference stock, 1,935,024 shares of Class A common and 500,000 shares of Class B common. Voting control rests with the Class B stock, which is owned by Dillon, Read & Co. The company, according to its last balance sheet, had total current assets of $46,747,527 and total current liabilities of $15,453,286. Total assets amount to $131,569,968.

E. G. Wilmer
Who will continue as president of Dodge Brothers

The Chrysler Corp. has outstanding 215,475 shares of $8 cumulative preferred, Series A, which it yesterday arranged to retire, and 2,712,080 shares of no par common stock. The last balance sheet shows total current assets of $55,655,581 and total current liabilities of $13,276,249. The total assets are given as $103,894,681.

The Dodge Brothers and Chrysler companies have a combined producing capacity of about 750,000 vehicles annually.

Rowland Leaves Overland

TOLEDO, May 31—Roland M. Rowland, who has been sales promotion manager for Willys-Overland Co., for more than five years, has resigned to accept a similar place in the Chrysler organization.

Pierce-Arrow Board Defers Jordan Action

BUFFALO, May 31—Directors of Pierce-Arrow Motor Car Co. met this week to discuss negotiations with that company for a merger with Jordan Motor Car Co. Following the meeting Myron Forbes, president of Pierce-Arrow, said no definite conclusion had been reached and that the negotiations would continue. It is reported that two large equipment manufacturers are participating in the negotiations.

Financial Notes

Citroen Automobile Co. proposes to increase its capital from 300,000,000 francs to 400,000,000 through offering of new shares at 700, and to obtain authority for a bond issue of 100,000,000 francs for extensions. Deliveries of cars since Jan. 1 total 34,671 against 24,979 in the same period last year. Of this year's sales to date 4661 were on credit against 937 in the same period last year.

A. G. Ghysels & Co., brokers, has placed 25,000 shares of common stock of the Grand Rapids Metalcraft Corp. on the market at $8.75 a share. The stock has been purchased from individuals and represents no new financing by the company. The corporation is one of the large producers of metal instrument panels, trim panels, etc., for the automotive industry.

Lee Rubber & Tire Co. for the six months ended April 30 reports net income of $91,148, equal to 30 cents a share on the 300,000 shares of stock. The company has used all the high priced rubber in inventory and in addition has set aside out of the past six months' operations a substantial amount to provide for contingencies.

Packard Motor Car Co. reports net income for the eight months ended April 30 as $14,844,522. This is equivalent to $4.94 a share and compares with $8,108,588, or $2.70 a share, for the corresponding period a year ago.

Evans Auto Loading Co. reports earnings for the first four months of the current year as $296,000, compared with $233,054 for the same period in 1927. Class A stock has been recalled and stockholders are to be allowed to convert to Class B stock up to and including July 2.

Cadillac Doubles Export Shipments

DETROIT, May 28—Shipments for export of Cadillac and La Salle cars in the first four months of 1928 totaled 1189, an increase of 110 per cent over the corresponding months of 1927, according to Lynn McNaughton, vice-president of the Cadillac Motor Car Co. This increase corresponds with forecasts made early in the year indicating better than a 100 per cent increase in export sales.

"Export sales abroad during 1927," Mr. McNaughton states, "showed an increase of 67 per cent. The dealers' organization has been correspondingly increased. The number of dealers in Cadillac and La Salle cars abroad now totals 494, an increase of 63 per cent over 1927, and an increase of 100 per cent over 1926."

The increase in this year's export business is considered particularly gratifying by company officials because 1927 was an introductory year for the La Salle car and the sales of both Cadillac and La Salle cars during the first four months of this year each totaled more than the combined sales of both cars during the same period of 1927.

Steel Buying Shows Seasonal Reduction

Competition Increased as Orders Decline But Prices Hold Former Levels

NEW YORK, May 29—While sheet and strip mills are more eagerly competing for orders which either can fill and which are especially attractive to the latter by reason of a worth-while tonnage covered by one specification, the downtrend in the steel demand of automotive consumers is so gentle and orderly on the whole that it makes possible gradual readjustment in mill activities, eliminating expensive dislocation during the transition period from capacity to a more moderate rate of production.

A somewhat easier pace marks shipments of full-finished automobile sheets, but the 4.00 cent price level is well maintained. Blue annealed and common black sheets are holding their own, with the minimum price 2.00 cents for the former and 2.70 cents for the latter. Once again rollers are faced by a condition in which concessions would hardly bring out orders for greater tonnages than would otherwise be the case, and so there is very little incentive to shade prices, competitive quotations named at times by continuous strip mills on widths that take sheet prices being in the case of round tonnages of one and the same gage and size based on production economies rather than arbitrary underselling.

There is some talk of mills advancing prices for hot-rolled bars but this is generally assumed to be in the nature of a precautionary measure, so that, if with the decline in demand the market should weaken, prices could give way to the extent of the $1 per ton advance that is talked of, and the present level, which producers look upon as an irreducible minimum, would be conserved. Demand for cold-finished steel bars from parts makers is light. Not much new business in automotive alloy steels is reported. Bolt and nut orders are few.

Pig Iron—Automotive foundries show no great interest in the market, although it is generally conceded that on anywhere near worthwhile tonnages contracted for now, slight concessions might be secured. The market may be nominally quoted at $17.50, Michigan delivery.

Aluminum—Higher prices for copper always have the effect of strengthening the position of aluminum, but the European Aluminum Cartel agreement expires in 1928, and there is considerable agitation in some European countries for lower aluminum prices. These, of course, would affect the American market situation. Moreover, aluminum's future price trend is likely to be more affected than that of any other metal by whatever effect the November elections will have on tariff legislation. The market remains steady and unchanged for the time being.

Copper—Further advances have lifted copper prices to 14¾ cents, delivered Connecticut, and 14¾ and 14⅞ cents, delivered Middle West—the top of the market's record for the last three years. All copper, brass, bronze, and nickel-silver products have undergone corresponding advances. Demand for automotive brasses continues fair.

Tin—The market is dull and devoid of new features. The London market was closed on Monday for the Whitmonday holiday and interruption of the week by this and Decoration Day caused business to drag.

Lead—In response to London advances, the leading interest raised the contract price to the extent of $2 a ton, the possibility of competition of foreign bullion lead in the American market having become more remote.

Zinc—Consuming demand continues light, but producers refrain from pushing sales at sacrifice of price.

Pyroxylin Manufacturers to Consider Practices

WASHINGTON, May 28—There will be a general conference of manufacturers, distributors and organized users of pyroxylin coated fabrics at the Hotel Commodore, New York, June 19, for the purpose of considering a simplified practice recommendation for this commodity.

Manufacturers of pyroxylin coated fabrics are of the opinion that there is a large and unnecessary number of constructions offered to the trade, resulting in confusion in the minds of buyers and inability to make proper comparison between the goods so offered. The simplified practice committee of the Asso tion of Pyroxlin Coated Fabric Manufacturers has made a survey of current practice in their industry and has submitted tentative recommendations with the request that the division of simplified practice organize a general conference of all interests to develop a simplified practice recommendation.

British Use Triplex Glass

NEW YORK, May 26—Hooper & Co., British automobile body builder, has adopted Triplex non-shatterable glass as standard, according to an announcement by the Triplex Safety Glass Co. In addition to this, it is stated, that two well-known car manufacturers will announce Triplex as standard before the end of the year. Ninety per cent of the British industry, in the estimation of the Triplex company, is now installing this type of glass as standard or optional equipment.

One to 4.78 in Washington

SEATTLE, May 26—There is one motor vehicle for every 4.78 persons in this state, although each group of 4.68 Seattle residents has a car, according to information obtained from the Automobile Club of Washington. In Spokane there is one machine available for every 3.91 persons, while in Tacoma the ratio is a car for each group of 4.80. The figures are based on registrations of Jan. 1, 1928. The State of Washington is nineteenth in total registrations.

Transmission Meter for Cabs Approved

Weights and Measures Conference Cites Advantages Over Front Wheel Type

WASHINGTON, May 26—Prevalence of four-wheel brakes, frequency of repairs and possibilities for dishonest employees to tamper with the mechanism were cited as disadvantages of a front wheel meter for taxicabs as compared with the transmission type meter, in a report as to the results of an investigation presented before the twenty-first National Conference on Weights and Measures now in session at the Bureau of Standards, by Ralph W. Smith, of that bureau.

The increasing number of automobiles with four-wheel brakes, the report pointed out, makes the adjustment of a taximeter to the front wheels a more difficult operation than on a taxicab with two-wheel brakes. Mr. Smith pointed out also that transmission type meters, checking the distance through the revolutions of the rear wheels, had an advantage over the front wheel meters because of the freedom of the former type from cable breakages and the elimination of replacements of broken ring gears and worn-out star gears. Since removal of the cab from operation means loss to the operator, he said, there is an advantage properly claimed for the transmission-driven taximeter which is subject to less tie-ups for repairs than the other type.

He also cited numerous instances in which claims had been made of dishonest employees tampering with taximeters and stated he was especially impressed by claims advanced for transmission meters to the effect that by their use, unauthorized mechanical changes in meter connections on the part of a dishonest driver or operator are greatly impeded because of the greater difficulty of access and manipulation.

"We are informed," the report states, "that in their advocacy of the transmission drive, the taximeter manufacturers are motivated by no direct financial interest in this question, and that insofar as their volume of business is concerned, it is a matter of indifference to them which type of drive is used for taximeters. Such tests as they have made and reported to us have indicated satisfactory performance of taximeters driven from the transmission."

He added that in a jurisdiction where transmission driven taximeters have been in use for a considerable time, complaints as to overcharging have not been prevalent.

Brogan Gets Van Dorn

CLEVELAND, May 26—The Van Dorn Electric Tool Co. announces that after July 1, G. W. Brogan, Inc., will handle its advertising account.

Time Payment Sales Gaining in Germany

Dr. Scholz Says Primary Obstacle to Large German Market is Price

NEW YORK, May 26—Obstacles which must be overcome before the German automotive industry will reach a stage comparable to the present American automobile industry were outlined by Dr. Wilhelm Scholz, general manager of the German Automobile Dealers Association, at a luncheon tendered to him this week by the National Automobile Chamber of Commerce.

The primary obstacle at present is the high cost, which is due partly to production costs and partly to the high tax at present in vogue. Before production costs can be brought down production must be undertaken on such a scale as to justify lower costs of parts and other general economies effected by mass production, in Dr. Scholz's opinion.

Seek Parts Standardization

Standardization of parts, such as has been effected in this country through the activities of the Society of Automotive Engineers, must be brought about in order to reduce cost of parts to a level where mass production is possible.

The present tax systems which also is largely responsible for the retarding of large volumes of sales, and which is based on the horsepower of the car, went into effect on April 1 of this year for a three-year trial, but Dr. Scholz predicted that at the end of the three-year period this system would be abandoned and a system similar to that used in this country would be inaugurated. The increase in tax under the present system, as the horsepower of the car increases, is not proportional, being much higher for the higher powered cars than it is for the lower powered cars. This serves to keep the higher powered, smooth running, more elastic cars, such as are popular in this country, in the luxury class in Germany, and this must be changed before these cars can be sold in any volume.

Instalment Rates Excessive

Asked about instalment buying in Germany, Dr. Scholz said that this plan in general was still regarded with disfavor by a large portion of the German populace. Time sales of automobiles have been handled in Germany only for two or three years and heretofore the rates have been almost prohibitive, running around 45 to 48 per cent for financing time sales. This latter condition is now being overcome and Dr. Scholz believes that the next few years will see a rapid breaking down of the German prejudice against instalment buying and a consequent increased purchase of automobiles on time.

Dr. Scholz estimated that domestic production in Germany for this year will be between 120,000 and 150,000 passenger cars, which is far in excess of all previous records. American cars sold in Germany, either imported direct or assembled there, will run around 20,000 to 25,000, in Dr. Schloz's opinion.

Time Sales in Europe Shown in U.S. Bulletin

WASHINGTON, May 26—Due to increasing use of the time payment system of purchasing motor vehicles in Europe, a questionnaire was recently sent to the foreign representatives of the Departments of State and Commerce and replies have been incorporated into Trade Information Bulletin No. 550 entitled "Installment Selling of Motor Vehicles in Europe." The bulletin was prepared by Ernest D. Cavanaugh of the automotive division of the Department of Commerce based on answers to the questionnaire and furnishes full details regarding financing facilities available for automobile instalment selling, assistance rendered by local banks, legal protection of the seller during the sales period, nature of the contract and other information.

French Air Mission Visits Metropolitan Factories

NEW YORK, May 26—The French Mission for the Development of Aeronautics, which is in this country for a two-weeks' visit, visited four plants in the metropolitan area yesterday to gain some idea of methods and production systems in this country.

Leaving Manhattan they stopped first at the Chance Vought Aircraft Corp. in Long Island City. From there they went to the Curtiss plant in Garden City, where they attended a luncheon in their honor. After the luncheon they flew from Curtiss Field to Teterboro Airport in New Jersey where they inspected the plant of the Atlantic Aircraft Corp. Thence they went to Paterson and were escorted through the factory of the Wright Aeronautical Corp.

Elgin Tries Out Plane

ELGIN, ILL., May 26—A model monoplane is being completed at the airport west of here and when it has been officially approved by the government, the Elgin Airways, Inc., recently incorporated with $25,000 capital, will begin manufacture of the plane for sale and distribution. Clarence W. Helm is president of the new company; Judson H. Wing and Arthur L. Paulson, directors.

Fokker Takes New Plant

NEW YORK, May 26—The Fokker Aircraft Corp. has taken a lease on a second plant near Glendale, W. Va., in order to meet the production schedule required by orders on its books. This factory contains 100,000 sq. ft. of floor space and is leased from the Ohio Valley Industrial Corp., with an option to buy.

40 Makers Penalized for Outlaw Showing

Bureau Permanent Withdraws Banishment But Imposes Fines for Reinstatement

PARIS, May 15 *(by mail)*—Forty automobile manufacturers, including 15 American makers and the whole of General Motors organization, were threatened with exclusion from the world's automobile shows for a period of one year at a meeting of the Bureau Permanent des Constructeurs d'Automobiles, held in Paris this week.

Last month an unauthorized automobile show was held at Brunn, Czecho-Slovakia, with about 40 exhibitors from the United States, France, Germany, Austria, Italy and England. In addition to the leading American makers, such well known European firms were present as Fiat, Citroen, Renault, Talbot, Hotchkiss, etc. This event being an outlaw show, according to the ruling of the Czecho-Slovakia Automobile Manufacturers Association, which comprises four makers, the proposal was made at the international gathering of the Bureau Permanent that the maximum penalty be imposed on all the exhibitors. This penalty is exclusion from all international automobile shows for a period of one year, and, if enforced, would have prevented these 40 makers appearing at such important shows as Paris, Brussels, Berlin, London, New York and Chicago.

The bureau admitted that its rules had been broken and passed a vote of censure on all the exhibitors. The situation was so exceptional, however, that a compromise was effected by the suggestion that each manufacturer should be allowed to buy back his right to international exhibitions on payment of a sum of not less than $200 and not more than $1,000, the cases to be examined individually by the secretary of the bureau, M. Henri Cezanne.

N.A.C.C. Delegates Attend

This meeting was attended by two delegates from the National Automobile Chamber of Commerce, J. D. Mooney, president of General Motors Export Co., and A. J. Brosseau, president of Mack Trucks, Inc., assisted by H. H. Kelly, automotive commissioner at the American Embassy, Paris.

The bureau decided that at its October gathering it would discuss the question of automobile representation at international exhibitions. The feeling was expressed that there were too many of these big international exhibitions and that the automobile industry gained nothing by taking part in them. On the other hand automobile shows should be encouraged.

The question of dazzling headlights was brought up for discussion and a report presented by the American delegates, but further action was deferred.

Retail Sales Show Gains in May

(Continued from page 852)

both new and used cars into June. The outlook for heavy retail business in June is extremely bright but this will be required to bring dealer stocks to satisfactory limits by mid-year.

Reports from leading trade centers follow:

New York

Sales of both new and used cars in the New York territory have been exceptionally large, considering the weather that has prevailed during a good part of the month, with stormy week-ends interfering with week-end sales. The sales figures, which compare generally on about an even basis with May of last year, point to a healthy condition in the market. Many companies are running ahead of May, 1927, with none falling very far behind. Given favorable weather conditions, all look forward to a particularly good June in new car sales. Sales curves are becoming smoother, in the opinion of many, not showing the sharp changes characteristic of the first few months of previous years. Trading in used cars has been more conservative and most dealers are in a comparatively solid position as far as used cars are concerned. Sales for the first two weeks of May were 8107 as compared with 6580 for the corresponding two weeks of May last year, according to Sherlock & Arnold.

Boston

Motor car sales for May have been better than April on the general average, and some of the dealers say they would have done better had they been able to get all the types they wanted. Anticipated new models coming out shortly have slowed down sales among dealers handling such lines. But they have been concentrating much efforts on the used cars. Ford cars are being seen on the streets now more plentifully. Ford deliveries are still somewhat indefinite, and with the flood of advance orders, other companies in that field are benefiting. With the warmer weather the demand for used cars shows an increase and the stocks piling up are being reduced to a more healthful level. There is more optimism prevailing among the distributors and dealers.

Detroit

Michigan automobile sales appear to have reached a new high point for the year in May and reports indicate a continuing strong demand for June. Business conditions throughout the state are much better than they have been for months and this has reflected favorably in the demand for cars. The strong demand for used cars is also particularly noticeable. Dealers in general report satisfactory turn-over of used cars and many have reduced stocks to such a low point that they are conducting energetic advertising campaigns asking for trade-ins. The big demand for motor vehicles is also reflecting favorably on commercial units, the demand for which is much more brisk than during earlier months of the year.

Atlanta

According to distributors of cars and trucks in Atlanta passenger car sales during May were about on the same basis as during April, with the exception of Chevrolet and Ford, both of which again reported a good gain. Medium and higher-priced cars, however, are failing to show any gain, probably due, distributors state, to the heavy business noted the first quarter of the year when several of the manufacturers announced new models at reduced prices. Dealers are confronted with a rather serious used-car situation, for the heavy business during the first three or four months of the year has left them with large stocks on hand which they are only able to dispose of at exceptionally low prices and to get rid of this stock several of the larger dealers continue to quote sacrifice prices on used-car merchandise. There seems to be little promise of improvement in the used-car situation in the very near future, most dealers declare. Distributors of motor trucks in Atlanta, however, say that during May they have noted another good gain in sales volume, estimating this at 20 to 25 per cent.

Cleveland

Business in new and used car sales for the month of May has been "spotty" according to Herbert Buckman, manager of the Cleveland Automobile Dealers and Manufacturers Association. Busy week ends have been reported with sales dropping abruptly by midweek, though trade on the whole has been running about even with that of May, 1927, Dealers report a perceptible slowing up at the end of the month and trace this to price cutting and persistent rumors of radically changed models by several of the larger makers.

Chicago

Sales of new cars in the Chicago territory upheld during May the fast pace set late in April. Many dealers report increases as high as 50 per cent in dollar volume over May a year ago, but the average is estimated at about 15 per cent over last May. New car stocks are low but the used car market, although late, opened up in May and stocks were materially decreased. All dealers feel very optimistic regarding the remaining seven months.

St. Louis

May sales showed a marked improvement over April, which was about 10 per cent below normal. Dealers are satisfied with the increase shown and now feel that a good business year is assured. Stocks of both new and used machines are normal, stocks being adequate for the demand.

Cincinnati

Both new and used car registrations show a healthy increase and business with parts and accessory dealers will reveal an even greater increase in comparison with May, 1927, as well as April, 1928. Automobile dealers express confidence that the improvement shown will continue until the middle of the summer, contending that various factors, chiefly weather conditions and delayed spring, caused buyers to delay purchases until spring weather had arrived definitely. Some accessory dealers complain of conditions which they attribute to the fact that cars are coming so fully equipped with accessories. Generally, however, they are satisfied and gratified over an unusually good demand for parts. Unemployment is decreasing daily, the stock market rise has had a tendency to add to general optimism and collections in most instances are good. New car sales for the first 21 days in May showed a 9 per cent increase over the same period in April and a 15 per cent increase over the same period in May a year ago. Used car increases for the same periods, respectively, were 14 per cent and 8 per cent.

Milwaukee

Milwaukee passenger car distributors and dealers look forward to June with probably the greatest optimism that has existed at the close of any month this year. Expectancy of active business is based on the steady improvement in general business, and the fact that May sales showed a substantial increase over last year, following a gain in April that was the first this year. Total sales of new cars in the state of Wisconsin in the first four months of 1928 were 20,890, compared with 24,537 in the same period of 1927, a decline of 3647 cars. However, a considerable share of the decrease is attributable to the Ford situation. The used car situation is improved by reason of a better demand with the advancement of the season and the improved employment situation. The Milwaukee dealers' salvage yard wrecked 1301 cars since its establishment last July, up to May 1. Only 80 cars were junked in April, as the greater effort was toward erection of new buildings and the general enlargement of the yard and its facilities. To May 1, 1444 cars had been received, and there were 143 cars in the yard on that date.

Minneapolis

Sails are all set in this district for a fine automobile retail business. It has already begun and promises to continue through the summer. Rural conditions as affecting farming are good and while there is always an "if" it is not stressed because the outlook is for a perfect harvest season. Cash sales are increasing and the used car is no longer the bogey it has been. In the cities business is good with the more expensive cars going well. Collections are generally good and repossessions incidental only.

Denver

Despite very unfavorable weather conditions during the past month, May has held up about equal with May, 1927, in this field, and collections are much better than they were a year ago. It has rained continuously for three weeks, and the fact that car buying is on a level with last year in spite of the weather indicates a very good prospect for a big pickup when good weather arrives. Throughout the territory a general feeling of optimism prevails. The best territory at present seems to be the San Luis Valley and Colorado Springs. The heavy rains have assured a crop of fall wheat, except in the extreme northeastern corner and all reservoirs are well filled, so there will be an abundance of water for irrigated crops.

New Orleans

A survey of the automotive situation in New Orleans is much more optimistic than last month and for the same period of last year. This is due principally to two factors; the signing of the Flood Control bill by the president, which assures the relief of this vicinity from future floods and indicates the probable expenditure of large sums of money in construction work. The

Ford assembling plant which employs approximately 1000 men has at last begun operations. While it is a fact that many customers who placed orders for Ford automobiles months ago have cancelled their orders and bought other light cars, chiefly Chevrolets, the fact remains that a large number have been content to wait until Ford delivery could be made. The local Ford dealers were beginning to weaken under the strain of long waiting and now that relief is in sight the outlook throughout the city is much more cheerful. The used car situation has improved considerably in the last few months, few dealers are too heavily stocked at this time.

Kansas City

Motor car sales in Kansas City and territory continue to show an upward tendency over this time last year. The same strength that has marked new car sales through the month also is true of the used car situation. A radical change in policy of the dealers in regards to used cars is having a good effect. This change is to keep all the junk cars and even the poorer cars that still have "unused transportation" in them off the sales lots and floors. The result is that the used car buyers are buying the better grade of used cars and the junk and salvage concerns are getting the rest. Some dealers are refusing to trade for used cars unless they are valued at more than $100. Several dealers report new all-time records for the month with sales as high as 300 per cent over last year. Gains of 100 per cent are not uncommon. Only in a few cases are there decreases and these can be traced either to stronger competition in that particular price class or to local conditions.

San Francisco

Northern and central California sales for May will fall about 5 per cent below those of same month last year and probably will be about equal to those of April this year, according to dealers. Used car sales are slow except for rebuilts and cars guaranteed by established dealers. June prospects are not good owing to vacations. Dealers blame present conditions to heavy buying of stocks for speculation by general public. This situation makes repair business better than it has been in five years. Truck sales somewhat better than a year ago.

Los Angeles

Southern California May sales are expected to fall below May of last year by about 15 per cent with probable slight increase over last month. General business conditions are moderately good. Used cars are moving well. Stocks in dealers hands still show increase over last year. Continued moderate improvements in truck market.

Seattle

New car sales in May were 5 to 10 per cent less than a year ago. The prospects are that the first six months will be approximately that far behind the same period of 1927. Ford influence on the other cars not so marked as there has been a considerable withdrawal of deposits by people who do not wish to wait for delivery. Chevrolet and other sales have shown considerable pick-up. Used car market is in best shape in years, especially in good priced cars, due to the public's desiring heavier models. Also dealers are paying more attention to merchandising used cars. General business and industrial outlook is good, with every prospect that the farming areas of the Pacific Northwest will record another splendid year. While the wheat crop of the United States is estimated as 12 per cent less this year than last, the farmers of this section have not materially reduced their acreage. Truck sales only fair to medium.

Aircraft Production Gains 65.4%; Value of Production Rises 60.6%

WASHINGTON, May 31—The aircraft industry of this country increased production 65.4 per cent by number of planes and 60.6 per cent by value in 1927 over 1926, according to data collected for the biennial census of manufactures, the Department of Commerce announces.

In 1926 production of plants engaged primarily in the manufacture of aircraft amounted to 1186 heavier-than-air craft valued at $8,871,027 while in 1927 the factories produced 1962 aircraft valued at $14,250,605, according to the compilations.

The division between the airplane class and the seaplane and amphibian class in 1926 was 1125 airplanes valued at $7,448,679 and 61 amphibians and seaplanes valued at $1,422,348; while in 1927 1857 airplanes valued at $12,024,085 and 105 seaplanes and amphibians valued at $2,226,520 were constructed.

A similar comparison for 1925 and 1927, based on a production of 789 aircraft valued at $6,673,659 in 1925, shows increases of 148.7 per cent in number and 113.5 per cent in value the census shows.

Sixty-one establishments reported for 1927. Fifteen were located in New York; nine each in California and Michigan, four each in Illinois, Missouri and Ohio; three each in New Jersey and Pennsylvania, two in Maryland and one each in Colorado, Connecticut, Iowa, Kansas, Nebraska, Virginia, Washington and Wisconsin.

Production statistics follow:

	1927	1926	1925	Percent of Increase or Decrease (—) 1926-7	1925-7
Number of Establishments	61	59*	44	†	†
Wage Earners (Average Number)	4,316	§	2,701	..	59.8
Wages	$6,701,967	§	$4,222,151	..	58.7
Cost of Materials (Shop supplies, fuel, purchased power included)	7,373,672	§	2,869,967	..	156.9
Products, total value	20,783,733	$17,694,905*	12,524,719	17.5	65.9
Airplanes:					
Number	1,857	1,125	711	65.1	161.2
Value	$12,024,085	$7,448,679	$5,908,335	61.4	103.5
Seaplanes and Amphibians:					
Number	105	61	78	72.1	34.6
Value	$2,226,520	$1,422,348	$765,324	56.5	190.9
Value of craft under construction	§	2,377,769	1,428,447	..	..
Parts and engines made for sale: Value	4,702,628	6,054,973	3,544,423	—22.3	32.7
All other products, repairs, experiments	1,830,500	391,136	878,190	368.0	108.4

Legends:

* These figures differ from those originally published for 1926 because of the exclusion here and inclusion in 1926 report of data for 8 establishments not canvassed at the biennial censuses.

† Per cent not computed where base is less than 100.

§ No data available.

Notes: Amount of manufacturers' profits not calculated in this compilation. Salaried employees not included under wages.

Express and Mail Service to Lead Aviation Growth

NEW YORK, May 26—Pointing out that revenues received from freight and mail were greater per pound than those from passenger service, Major General John F. O'Ryan, president of the Colonial Aircraft Co., told members of the Exchange Club this week that the future of aviation in America will lie in the freight, express and mail service rather than in its passenger service.

"Ground transportation," he said, "is slowing up rather than increasing its speed, because it has been found commercially more expedient to travel at moderate rates of speed."

Brown & Bigelow Form Aircraft Service Firm

NEW YORK, May 28—Archibald Black and Anson A. Bigelow have organized the firm of Black & Bigelow, Inc., with offices at 551 Fifth Ave., New York, to render engineering and business services to aircraft operators, manufacturers and others interested in aviation. Mr. Black is president; Mr. Bigelow, vice-president; G. M. Pynchon, Jr., treasurer, and J. H. O'Connell, secretary.

Directors include B. F. Castle, C. H. Colvin, S. M. Fairchild, C. T. Ludington, W. A. Rockefeller, and Lorillard Spencer. Associated with the company also are Prof. Alexander Klemin, R. A. Lipscomb, and P. H. Caine. Stockholders include many men well-known in the aviation field in addition to those listed as officials, directors or associates.

General Parts Buys Lancaster Rubber

LANCASTER, OHIO, May 28—The plant, including real estate and buildings, machinery and equipment, raw materials and finished product of the Lancaster Tire & Rubber Co., which went into bankruptcy several months ago, has been sold to the General Parts Co. of Detroit at receivers sale. The consideration was approximately $103,000.

The General Parts Co. has turned over the plant, including the machinery and equipment in the heel and sole department, to the Fairfield Rubber Co. of Columbus, which is a subsidiary of the H. C. Godman Co. This company will occupy the entire factory and will increase its output of heels, soles and rubber stripe, used in the manufacture of shoes.

The tire making machinery will be moved to another plant, it is announced by officials of the General Parts Co. Thomas McKeon, formerly manager of the Lancaster Tire & Rubber Co., will be manager of the Fairfield Rubber Co. The company is capitalized at $100,000 and Frederick A. Miller is its president.

Brunner Acquires Air Scale

BUFFALO, May 28—Brunner Mfg. Co. has added the air scales formerly marketed by the Air Scale Co., Toledo, to its line. The scales eliminate the need for tire gages by weighing the exact amount of air needed for various types of tires.

Lycoming Gets British Order

CHICAGO, May 26—Vauxhall, Ltd., of England, has placed an order with Lycoming Mfg. Co., subsidiary of the Auburn Automobile Co., for 2000 engines to be delivered as soon as possible.

Coming Feature Issues of Chilton Class Journal Publications

June 10—A. E. A. Summer Meeting Number—Motor World Wholesale

June 23—Engineering Issue—Automotive Industries

Oct. 10—Marketing Annual for 1929—Motor World Wholesale.

Bureau of Mines Shows Carbon Monoxide Peril

WASHINGTON, May 26—In cooperation with a large automobile manufacturing concern, the U. S. Bureau of Mines, Department of Commerce, is producing a new educational motion picture film dealing with the dangers of carbon monoxide poisoning and its prevention, according to a statement from the department.

The statement attributes more than 1000 deaths to this universal poison gas during the last year, specifying that at least 700 were due to drivers of automobiles being overcome while their engines were idling in closed garages. The film will show how accumulations of carbon monoxide may be prevented by proper ventilation and the methods of first aid and resuscitation for victims of the poison gas.

F.W.D. Adds 2-Ton Model

MILWAUKEE, May 28—A new FWD line construction model truck designated the HT model has been added to the line of the Four Wheel Drive Auto Co., Clintonville, Wis. The new model is rated at two tons and is designed for a speed of 35 m.p.h. and for negotiating the heavy road conditions encountered in line construction work.

Salons to Expand in 1928-29 Season

NEW YORK, May 28—Preliminary announcement of the plans for the twenty-fourth annual Automobile Salon schedule four sessions of this exhibition of fine chassis and custom coachwork, to be held in New York, Chicago, Los Angeles and San Francisco.

The dates for the 1928-1929 season are as follows: New York, Hotel Commodore, Dec. 2 to 8, 1928; Chicago, Hotel Drake, Jan. 26 to Feb. 2, 1929; Los Angeles, Hotel Biltmore, Feb. 9 to 16, 1929; and San Francisco, Palace Hotel, Feb. 23 to March 2.

Requests for space already received on behalf of eligible chassis and real custom-built coachwork considerably exceed the exhibition space available in the four prominent hotels. At the Commodore in New York the overflow exhibits in the main lobby will rival the main salon on the ballroom floor. In Chicago additional space has been arranged at the Drake, so that this salon will also be larger than ever before. The new ballroom at the Biltmore in Los Angeles will accommodate about twice as many exhibits as have been displayed there in the past two seasons, while the famous main dining room of the Palace will be utilized in San Francisco.

Hupp Has 1662 Dealers

DETROIT, May 26—According to R. S. Cole, general sales manager of Hupp Motor Car Corp., Hupmobile on May 15 had 1662 selling outlets, with the number steadily increasing. The following new Hupmobile distributors were announced by Mr. Cole: T. A. Bryson & Sons, Savannah; Pumphrey Motor Co., Wichita; Lewis Motor Co., Fargo; Stearns Motor Car Co., Minot, N. D., and the Hartman Motor Co., of Sioux Falls, S. D.

Calendar of Coming Events

SHOWS

American Electric Railway Ass'n, Public Auditorium, Cleveland..Sept. 22-28
American Road Builders Association, Inc., Cleveland Auditorium..Jan. 14-19
American Society for Steel Treating, Commercial Museum, Philadelphia .....Oct. 8-13
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
Berlin .....Nov. 8-18
Brussels .....Dec. 8-19
*Chicago .....Jan. 26-Feb. 2
International Aeronautical Exposition, Grand Palais, Paris....June 29-July 15
Layback, Jugoslavia .....June 2-11
London, passenger cars .....Oct. 11-20
National Standard Parts Association, Cleveland Auditorium...Oct. 29-Nov. 3
*New York .....Jan. 5-12
Paris, passenger cars .....Oct. 4-14
Paris, trucks .....Nov. 15-25
Prague .....Sept. 1-9
Radio Manufacturers Assn., Inc., Stevens Hotel, Chicago .....June 11-15
Salon, Automobile Salon, Inc., Hotel Drake, Chicago .....Jan. 26-Feb. 2
Salon, Automobile Salon, Inc., Hotel Biltmore, Los Angeles.....Feb. 9-16
Salon, Automobile Salon, Inc., Hotel Commodore, New York .....Dec. 2-8
Salon, Automobile Salon, Inc., Palace Hotel, San Francisco...Feb. 23-Mar. 2

*** Will have special shop equipment exhibit.**

CONVENTIONS

American Automobile Association, Bus Division Meeting, Cincinnati, June 27-28
American Automobile Association, Annual Meeting, Cincinnati....June 28-29
American Electric Railway Ass'n, Public Auditorium, Cleveland...Sept. 22-28
American Gear Manufacturers Association, Statler Hotel, Buffalo, N. Y., Oct. 11-13
American Road Builders Ass'n, Inc., Cleveland Auditorium .....Jan. 14-19
American Society for Steel Treating, Commercial Museum, Philadelphia .....Oct. 8-13
American Society for Testing Materials, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J. .....June 25-29
Automotive Engine Rebuilders Association, Coronado Hotel, St. Louis, June 11-14
Automotive Equipment Association, Grand Hotel, Mackinac Island, June 17-23
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
National Association of Automobile Show and Association Managers, Before-Shows, Drake Hotel, Chicago .....July 26-27
National Association of Credit Men, Hotel Olympia, Seattle, Washington .....June 11-16
National Safety Council, National Congress, New York .....Oct. 1-5
National Standard Parts Association, Hollenden Hotel, Cleveland, Oct. 29-Nov. 3
Overseas Automotive Club, Luncheons, Hotel Astor, New York .....June 14
Radio Manufacturers Assn., Inc., Stevens Hotel, Chicago .....June 11-15
Society of Industrial Engineers, Rochester, N. Y. .....Oct. 17-19
World Motor Transport Congress, Rome .....Sept. 25-29

A. S. M. E.

Cincinnati, Oct. 22-25—Machine Shop Practice.
Cleveland, Sept. 17-20—Fuels.
Detroit, June 28-29—Aeronautic Division.
State College, Pa., June 14-16—Oil and Gas Power.

S. A. E.

National

Quebec, Chateau Frontenac.....June 26-29

RACES

Altoona .....June 16
Belgium .....Aug. 12
France .....July 1
Germany .....July 15
Great Britain .....Sept. 22
Italy .....Sept. 2
Spain .....July 29